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OF

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OF THE

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OF

CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XLIX—No. 3.

MARCH, 1923

Edited by the Secretary, under the direction of the Committee on Technical Activities and Publications.

NEW YORK 1923

American Society of Civil Engineers

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ON ELECTRIFICATION OF STEAM RAILWAYS: Charles F. Loweth, Bion J. Arnold, George Gibbs, George W. Kittredge, E. J. Pearson, Samuel Rea, Robert Ridgway.

ON STRESSES IN STRUCTURAL STEEL: F. O. Dufour, Clement E. Chase, O. F. Dalstrom, J. H. Edwards, R. J. Fogg, F. W. Masters, L. D. Rights, F. E. Schmitt, W. J. Thomas.

ON IMPACT IN HIGHWAY BRIDGES: A. H. Fuller, A. R. Eitzen, E. F. Kelley, C. T. Morris, F. E. Turneaure.

ON FLOOD-PROTECTION DATA: N. C. Grover, C. B. Burdick, W. P. Creager, H. P. Eddy, Gerard H. Matthes, Charles H. Paul, A. O. Ridgway.

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AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

SOCIETY AFFAIRS

CONTENTS

ITEMS OF INTEREST

The Committee on Technical Activities and Publications will be glad to receive communications of general interest to the Society, and will consider them for publication in *Proceedings* in "Items of Interest". This is intended to cover letters or suggestions from our membership concerning matters which are not of a technical character. Such communications, however, must not be controversial or commercial.

Scholarship in Civil Engineering at Columbia University

The governing bodies of Columbia University have placed at the disposal of the Society, a scholarship in Civil Engineering in the Schools of Mines, Engineering and Chemistry of Columbia University, beginning with the academic year 1922-23 and continuing until further notice. The scholarship

pays $350 toward the annual tuition fees, which vary from $340 to $360, according to the details of the course selected. Re-appointment of the student to the scholarship for the completion of his course is conditioned upon the maintenance of a good standing in his work.

To be eligible for the scholarship, the candidate recommended will have to meet the regular admission requirements, in regard to which full information will be sent without charge upon application to the Secretary of the University or to the Secretary of the Society.

In a letter addressed to the Secretary of the Society, an applicant for this scholarship should set forth his qualifications (age, place of birth, education, statement of any other activities, such as athletics or working way through college, references, and photograph). A committee composed of Messrs. Robert Ridgway, C. W. Hudson, and J. P. H. Perry will consider the applications and will notify the authorities of Columbia University of their selection of a candidate. The last day for the filing of applications will be July 1 of each year.

The course at the Columbia Schools of Mines, Engineering and Chemistry is three years in length and is on a graduate basis. A candidate for admission must have had a general education, including considerable work in mathematics, physics, and chemistry. Three years of preparatory work in a good college or scientific school should be sufficient, if special attention has been given to the three preparatory subjects mentioned. A college graduate, with a Bachelor of Science degree in engineering, can generally qualify to advantage. The candidate is admitted on the basis of his previous collegiate record, and without undergoing special examinations. Other qualifications being equal, members of Student Chapters of the Society will be given preference.

The purpose of this advanced course is to produce a high type of engineer, trained in the humanities as well as in the fundamentals of his profession. It is hoped that members will show a keen interest in this scholarship, which will insure the choice of a candidate of the highest qualifications.

Fifty Years in the Society

It should be of interest to the members to know that there are fourteen men who have been members of the Society for fifty years or more. The following list gives the names of these members with the dates of their election:

William S. Auchincloss.....February 17, 1869
Hezekiah Bissell.....September 15, 1869
Clemens Herschel.....April 21, 1869
Thomas Pearson Kinsley.....February 5, 1873
Charles Macdonald.....September 15, 1869
William Walter Maclay.....November 6, 1872
Charles McMillan.....January 29, 1868
Charles Stewart Maurice.....May 15, 1872
Marshall Morris.....March 5, 1873

Ralph Gooding Packard.....February 17, 1869
William Rotch.....March 5, 1873
Howard Soule.....March 17, 1869
Cady Staley.....March 17, 1869
William Halsted Wiley.....February 17, 1869

French and American National Societies of Civil Engineers to Co-operate in Use of Engineering Buildings

At the meeting of the Trustees of United Engineering Society, held on May 25, 1922, it was voted "that United Engineering Society extend an invitation to the American Section of Société des Ingénieurs Civils de France to hold meetings in Engineering Societies Building, 33 West 39th Street, New York City, the details of arrangement in each case to be left to the Secretary with power."

In recognition of this courtesy, the Société des Ingénieurs Civils de France has extended to American Engineers in Paris, the courtesy of the rooms in its building, 19 rue Blanche, Paris, France, for their meetings.

The Secretary of the Society has sent a notice of this action to all members of the Society in France, and to all the Local Sections.

Two New Projects of the American Engineering Standards Committee

The American Engineering Standards Committee has undertaken two new projects, namely, the standardization of abbreviations and symbols and of methods of testing wood.

Standardization of Abbreviations and Symbols

The American Engineering Standards Committee has been requested to call a Conference to consider the standardization of abbreviations and of the symbols used in engineering equations and formulas. The need for the standardization of abbreviations is emphasized by the existing confusion resulting from the variety of symbols for one thing and the multiplicity of meanings of one symbol. The expression "pounds per square inch", for instance, may be represented by at least a half dozen abbreviations.

The conference will take up the following questions for discussion and decision:

1.—Brief review of present practice of representative organizations.

2.—Brief review of practice of international and of foreign bodies.

3.—Shall the unification of abbreviations used in engineering reports, tables, publications, etc., be undertaken?

(*a*) If so, what shall be the scope of the work? For example, shall a broad program covering the general engineering field be undertaken, or shall the work be confined to one or more restricted fields?

(*b*) If the latter, what shall these fields be? For example, civil, chemical, electrical, mechanical, or others, including municipal, sanitary,

military, railway, mining, architectural, metallurgical, management?

4.—Shall the unification of symbols for quantities used in engineering equations, formulas and tables, be undertaken?

(*a*) If so, what shall be the scope of the work? For example, shall a broad program covering the general engineering field be undertaken, or shall the work be confined to one or more restricted fields?

(*b*) If the latter, what shall these fields be? For example, civil, chemical, electrical, mechanical, or others, including municipal, sanitary, military, railway, mining, architectural, metallurgical, management?

5.—If both lines of activities (Items 3 and 4) are to go forward, should they be carried out as parts of a single undertaking or as two separate undertakings?

6.—How shall such unification be related to similar lines of work? For example, mathematical signs and conventions used in drawings and diagrams?

7.—Is it desirable that either line of activity be correlated with work on definitions of terms used in engineering practice?

8.—What recommendations, if any, shall be made to a continuing (sectional) committee, should one be organized, for example, as to orienting the work in such a way as to facilitate international agreement?

9.—How shall the work be organized? For example, is it desirable to make the working committee (or committees) sufficiently large to be thoroughly representative, or is it desirable to keep it smaller, sending successive drafts of standards, minutes, etc., to interested organizations for comment and criticism?

Any organization desiring to be represented at the conference, that has not received an invitation, is requested to communicate with the American Engineering Standards Committee, 29 West 39th Street, New York City.

Standardization of Methods of Testing Wood

The U. S. Forest Service and the American Society for Testing Materials have been appointed joint sponsors, and sixteen additional organizations are represented on the Sectional Committee which is to make an intensive study of the standardization of methods of testing wood, under the auspices of the American Engineering Standards Committee.

The scope of the Committee's activities embraces the standardization of physical (including mechanical) tests of wood specimens. L. J. Markwardt, of the Forest Products Laboratories, at Madison, Wis., has been elected Chairman, and M. O. Withey, Professor of Mechanics, University of Wisconsin, has been elected Secretary, of the Sectional Committee. The other members of the Committee and the organizations which they represent are as follows: W. H. Allen, U. S. Navy Department; C. E. Alderman, U. S. War Department; C. H. Amadon, Associated Bell Telephone Companies; C. M. Bigelow, American Society of Mechanical Engineers; Guy Davis, Manufacturers Air-

craft Association; W. T. Dorrance (J. W. Orrock, Alternate), American Railway Engineering Association; John Foley, Association of Wood-Using Industries; G. R. Green, Society of American Foresters; Henry Gulick, American Electric Railway Association; P. R. Camp, D. F. Holtman and Fred F. Murray, National Lumber Manufacturers Association; C. W. Killam, American Institute of Architects; L. J. Markwardt, U. S. Forest Service; T. W. Norcross, American Society of Civil Engineers; C. E. Paul (C. J. Hogue, Alternate), American Railway Engineering Association; C. N. Perrin, National Hardwood Lumber Association; E. H. Rigg, Society of Naval Architects and Marine Engineers; H. L. Whittemore, U. S. Bureau of Standards; M. O. Withey, American Society for Testing Materials; and P. W. Wittemann, Society of Automotive Engineers.

Appeal for Aid from Simbirsk School of Technology

Through the American Relief Administration in Russia, the Secretary has received applications for food and clothing from the teachers and students in the Simbirsk School of Technology.

The American Relief Administration states that food and clothing are greatly needed in Russia and that, on application to its office at 42 Broadway, New York City, application forms will be furnished by means of which, any designated individual or group of individuals in Russia may be assisted with foodstuffs and clothing.

ACTIVITIES OF LOCAL SECTIONS*

Meeting of the San Francisco Section

The regular meeting of the San Francisco Section was called to order on December 19, 1922, at the Engineers' Club; President Thomas H. Means in the chair; Henry D. Dewell, Secretary; and present, also, 92 members and guests.

Among the guests present at the meeting were Frederick Ohrt, Assoc. M. Am. Soc. C. E., and Mr. Joseph H. Granger, of Honolulu, Hawaii, and A. D. Wilder, Assoc. M. Am. Soc. C. E., of Vancouver, B. C., Canada.

The Secretary read the following communications: Letters from the Sacramento Section and the Los Angeles Chapter of the American Association of Engineers urging action on the reported reduction of salaries of officials of the State Department of Public Works, which matters, after discussion, were referred to the Welfare Committee; letter from the St. Louis Section asking for opinion on the paper presented before that Section by W. J. Knight, M. Am. Soc. C. E., on "Is the American Society of Civil Engineers a Progressive Institution", which also was referred to the Welfare Committee; a resolution adopted by the Detroit Section protesting against the use of Society funds for the maintenance of a free employment service of the Founder Societies, was referred to Vice-President Huber, the meeting being favorable to the resolution of the Detroit Section; circular letters from Secretary Dunlap of the Society asking for an opinion on the creation of a Benevolent Fund of the Society, and calling attention to the recent action of the Board of Direction relative to undue campaign propaganda; a letter from Paul Bailey, Deputy Chief of the Division of Engineering and Irrigation, State Department of Public Works, suggesting that the work of that Department of Water Resources be presented before the Section by addresses by the three principal assistants on that work, Messrs. Jones, Post, and Scobey, relative to which President Means reported that the Board of Directors was considering a special meeting to hear these reports.

The Secretary announced that the report of the Special Committee of the Section on the Proposed Universal Form of Contract Agreement, consisting of Messrs. Thurston, Kirkbride, and Vensano, had been completed and forwarded to Secretary Dunlap for transmittal to the Special Committee on Contract Standard Clauses of the Society.

Announcement was also made that the Board of Directors had requested the Board of Direction of the Society for an allowance of $3 per member of the Section for dues.

Mr. Nathan A. Bowers, Chairman of the Special Committee on Publicity, reported favorably for his Committee on the question of the acquisition of a publicity manager, and on motion, duly seconded, Mr. Howard G. Hanvey was appointed as Publicity Representative of the Section for two months, the matter to be considered again at the February meeting.

* For list of Local Sections, Officers, etc., see 1922 Year Book, p. 41, and p. 138 of this number of *Proceedings*.

Mr. C. H. Lee addressed the meeting on the action of the American Association of Engineers in the matter of a bill for licensing engineers to be passed by the next Legislature, and urged that the Section co-operate with the Association in the matter. After discussion of the subject, on motion, duly seconded, President Means was authorized to appoint a committee of five to confer with other organizations interested in the licensing of engineers and to give attention to all legislative matters of interest to engineers.

The following resolution was proposed by Mr. Frank G. White, and on motion, duly seconded, was unanimously carried:

"*Whereas,* the number of members of the American Society of Civil Engineers residing in Northern California, having mutuality of interest and convenience of meeting, is approximately the number required to form a District and since the division of this membership into two or more Districts is neither necessary or desirable; therefore,

"*Be It Resolved,* that the San Francisco Section of the American Society of Civil Engineers is unalterably opposed to any plan for redistricting the membership of the Society which divides the membership of the San Francisco Section into separate Districts.

"The Secretary of the Section is directed to transmit a copy of this resolution to the Board of Direction and to the Chairman of the Committee on Redistricting".

The following officers were elected for the ensuing year: President, G. A. Elliott; Vice-Presidents, Frank G. White and H. H. Wadsworth; and Secretary-Treasurer, Henry D. Dewell.

The address of the evening was presented by Mr. Frank G. White, Chief Engineer of the Board of State Harbor Commissioners, who spoke on "The China Basin Terminal: A Study of Port Terminal Warehouses".

Meeting of the Atlanta Section

A meeting of the Atlanta Section was held at the Winecoff Hotel on January 8, 1923; President Searcy B. Slack in the chair; Frederick H. McDonald, Secretary; and present, also, 21 members.

The Standing Committees for 1923 were organized, and plans for the future activities of the Section were made.

Messrs. J. G. Wilburn and R. G. Lose presented interesting descriptions of the design and construction of the $1 000 000 Extension to the Federal Reserve Bank in Atlanta.

Relative to the request of the Detroit Section, the question of the continuance of participation by the Society in Engineering Societies Service Bureau was discussed, and the following conclusions were unanimously endorsed by the meeting:

"As a general proposition, the maintenance of an employment service can be a most helpful Society function.

"It is, however, an activity which results in benefits to definite individuals, with no particular benefits to the Society as a whole. Therefore, there seems to be no reason why the expense of such a service should be borne by all of the Society.

"The recorded cost of this service, per person placed, is not high considering the advantages gained; and in each case, the sole beneficiary, as far as the Society is concerned, is the person for whom the position is obtained.

"We, therefore, recommend the continuance of the Society's participation in the employment service under such an arrangement as will transfer as nearly as practicable the cost of securing each position to the individual benefited in the shape of a suitable fee.

"Believing, also, that much benefit would accrue to all concerned if this activity of the several societies was popularized to a larger extent, we recommend that such steps as may seem advisable be taken to acquaint present and probable regular employers of technical men with the existence of this very reliable source of obtaining qualified help."

Meeting of the Cleveland Section

A regular meeting of the Cleveland Section was held at the Hotel Winton on January 10, 1923; President A. V. Ruggles in the chair; George H. Tinker, Secretary; and present, also, 16 members.

The minutes of the meeting of November 8, 1922, were read and approved, the Secretary reporting that no quorum was present at the meeting of December 13, 1922.

The Secretary-Treasurer presented his Annual Report.

On motion, duly seconded, President Ruggles appointed the following as a Nominating Committee: Messrs. J. H. Tufel, W. P. Brown, and K. H. Osborn.

On motion, duly seconded, it was voted to invite Col. H. C. Boyden to address a joint meeting of the Section and the Cleveland Engineering Society on March 23, 1923.

After a general discussion of the subject, on motion, duly seconded, it was voted to endorse the effort of the Cincinnati Section to secure the Annual Convention of the Society in 1925.

A motion that the Section favor the establishment by the Board of Direction of a Benevolent Fund was lost.

The Nominating Committee reported the following ticket for the officers for 1923: President, W. E. Pease; Vice-President, D. W. Morrow; and Secretary-Treasurer, George H. Tinker.

On motion, duly seconded and carried, the nominations were declared closed, and the Secretary cast the unanimous ballot for the candidates nominated.

Meeting of the Colorado Section

A regular meeting of the Colorado Section was held at the Metropole Hotel, Denver, Colo., on January 6, 1923; President Thomas H. Olds in the chair; R. I. Meeker, Secretary; and present, also, 22 members and 3 guests.

The minutes of the special meeting of September 26, 1922, were read and approved.

The report of the Committee on Re-districting, appointed at the meeting of September 26, 1922, was read and the two proposed arrangements, designated as Exhibits "A" and "B", were fully discussed. An alternate plan sug-

gested by G. G. Anderson, M. Am. Soc. C. E., of Los Angeles, Calif., was read by the Secretary and discussed by several members present. After discussion, it was moved, seconded, and carried:

"That the report of the committee be accepted and that with reference to the arrangement of districts as shown on Exhibit A, it having appeared that the membership of the State of Texas have strong objections to dividing the State as suggested in the said Exhibit, the suggestion is therefore withdrawn in its entirety and the alternate recommendation as shown on Exhibit B is approved and urged by the Colorado Section; and, further, that the committee be continued and instructed to report promptly the action of the Section to the Secretary and Re-districting Committee of the Parent Society advising them of the reasons which have been advanced in open meeting for the position of this Section in urging that we return to the grouping in effect just prior to the present districting as announced in the Year Book for 1922".

Secretary Meeker presented an interesting paper on the "Hetch Hetchy Water Supply for the City of San Francisco" and illustrated his remarks with lantern slides. He presented some valuable cost data and figures relative to the storage capacity of the various reservoirs and discussed briefly the Colorado River Compact, outlining the probable distribution of waters to the various basins and States. An interesting discussion of these subjects followed the presentation of the paper.

New Officers of the Dayton Section

The following officers have been elected by the Dayton Section for the ensuing year: President, Ivan E. Houk; Vice-President, Charlton D. Putnam; and Secretary-Treasurer, C. H. Eiffert.

Meeting of the Detroit Section

The meeting of the Detroit Section was called to order at the Hotel Cadillac, on January 26, 1923; President Charles Y. Dixon in the chair; F. H. Stephenson, Secretary; and present, also, 28 members.

The minutes of the previous meeting were read and approved.

The Secretary presented a letter from Secretary Dunlap of the Parent Society transmitting the approval of the Board of Direction to the request that the Section be allowed to reduce its annual dues to $1.00. After discussion of the subject, the Secretary was instructed, on motion, duly seconded, to prepare the necessary letter-ballot to make the change in annual dues effective.

Letters from Local Sections at Atlanta, Ga., and St. Louis, Mo., relative to matters of general interest to the Society, were read by the Secretary.

After discussion of the subject, it was voted to be the sense of the meeting that the Section was opposed to the creation of a Benevolent Fund by the Society.

Mr. Gardner S. Williams addressed the meeting on the activities and accomplishments of the Federated American Engineering Societies, mentioning particularly the investigation entitled "Waste in Industry" and the work done toward securing a larger appropriation for topographical surveys.

On motion, duly seconded, the Secretary was instructed to render assistance to any members of the Section who wished to write to other members in behalf of the topographical work in the State of Michigan.

Director George H. Fenkell discussed his experiences at the Annual Meeting of the Society and also other matters of general interest to the Society.

The question of Student Chapters and the desirability of establishing them at the University of Michigan and Michigan Agricultural College was discussed in detail, and, on motion, duly seconded, it was voted to instruct President Dixon to act with Director Fenkell and the faculty members of the two schools in an endeavor to establish a Student Chapter at each Institution.

The Committee on Rapid Transit reported that through its efforts the Mayor of Detroit had appointed a Rapid Transit Commission of five members to study the transportation needs of the city and report thereon. Two of the five members are members of the Society, and the Consulting Engineer who has been retained is also a member of the Society.

Mr. E. M. Walker addressed the meeting on "The Proposed Zoning Ordinance for Detroit", illustrating his remarks with lantern slides.

Meetings of the Los Angeles Section

A meeting of the Los Angeles Section was held at the City Club on November 8, 1922; President Ralph J. Reed in the chair; F. G. Dessery, Secretary; and present, also, 25 members and 4 guests.

A paper by Ford A. Carpenter, Affiliate, Am. Soc. C. E., entitled "Climatic Surveying" was presented by the author, who discussed several examples of such surveying which had come under his observation, presenting a description of the methods used and the accomplishments for the benefit of agriculture and local colonization. The subject was also discussed by several of those present at the meeting.

President Reed announced the election to membership in the Section of Messrs. Ralph E. Brownell, Henry Baker Lynch, Harry French Blaney, Harold Stuart Fisher, M. N. Lebedeff, Walter Colton Little, Jr., and R. R. Martel.

Annual Meeting of December 13, 1922

The Annual Meeting of the Section was held at the City Club on December 13, 1922; President Ralph J. Reed in the chair; F. G. Dessery, Secretary; and present, also, 62 members and 23 guests.

Treasurer E. R. Bowen submitted his Annual Report and the audit of the books of the Section, which, on motion, duly seconded, was adopted, and a vote of thanks was given to Mr. Bowen.

The Secretary presented his Annual Report showing the activities of the Section for the year.

President Reed called attention to the inauguration at this meeting of the membership buttons and requested all members to wear them at all meetings.

Mr. G. G. Anderson introduced Mr. Charles Warren Hunt, Secretary Emeritus of the Society, who spoke of the Society's activities in the past. Mr.

Anderson also introduced Thomas L. Wilkinson, M. Am. Soc. C. E., of Denver, Colo., who addressed the meeting briefly.

Lloyd Aldrich, M. Am. Soc. C. E., of San Francisco, Calif., addressed the meeting in detail on the subject, "The Test Highway at Pittsburg, California", illustrating his remarks with three reels of moving pictures. Mr. Aldrich had charge of the construction and tests to destruction of this highway. The subject was discussed by Messrs. Reed, Binckley, Stone, Orbison, Petit, Code, Jubb, Brownell, Bowen, Patch, Woodard, Barnard, Morris, and Dessery.

On motion, duly seconded, Mr. Aldrich was given a vote of thanks for his address.

Mr. S. A. Jubb discussed briefly the "Los Angeles Traffic Conditions", suggesting overhead steel construction as a remedy. He also suggested that the problem being an engineering one, the Section take an active interest in its solution, and, on motion, duly seconded, it was decided that the incoming President, Franklin D. Howell, be authorized to appoint a committee to take up the question.

President Reed thanked the members of the Section for their co-operation during the year, and, in the absence of President-elect Howell, turned the meeting over to the Senior Vice-President, W. H. Code, who addressed the meeting briefly and called for a rising vote of thanks for Past-President Reed.

Meeting of January 10, 1923

The meeting of the Los Angeles Section was called to order at the City Club on January 10, 1923; President Franklin D. Howell in the chair; F. G. Dessery, Secretary; and present, also, 59 members and 20 guests.

President Howell introduced the following new members of the Section: Messrs. Ralph W. Lawton, Donald Hull McCreery, and R. R. Martel.

The proposal to create a Benevolent Fund for the Society was outlined by President Howell, and after discussion by Messrs. Dennis, Brackenridge, and others, the following resolution was, on motion, duly seconded, unanimously adopted:

"The Los Angeles Section heartily approves of the proposal to create a Benevolent Fund in the Society."

A communication dated December 27, 1922, from A. J. Capron, Secretary of the San Francisco Chapter of the American Association of Engineers, together with a proposed "Engineers' License Law for California", as provided by the Public Affairs Committee of that Chapter, was presented by President Howell who also read a written discussion and criticism of the proposed law by Mr. G. G. Anderson.

The subject was discussed by Messrs. Howell, Orbison, and Jubb, and, on motion, duly seconded, the following resolution was adopted unanimously:

"That the Los Angeles Section is opposed to any proposal to register or license engineers in the State of California during the present session of the State Legislature".

The following committee was appointed to watch this proposed License Act, President Howell and Messrs. G. G. Anderson, R. W. Lawton, C. E. Noerenberg, and L. C. Hill.

A letter dated October 27, 1922, from George D. Hall, Secretary of the Joint Committee of the Technical Societies, relating to the application of the American Association of Engineers for membership in the Joint Committee was read, and, on motion, duly seconded, the Section unanimously approved the reinstatement of the Los Angeles Chapter of the American Association of Engineers for membership in the Joint Committee of the Technical Societies.

President Howell referred to the invitation extended by the City of Pasadena to the Society to hold the 1924 Convention in Pasadena, and Professor F. Thomas discussed the invitation. On motion, duly seconded, the meeting expressed itself unanimously in favor of holding the 1924 Convention of the Society at Pasadena.

H. Z. Osborne, Jr., M. Am. Soc. C. E., Chief Engineer of the Board of Public Utilities of Los Angeles, addressed the meeting on "Traffic Congestion in Los Angeles and Its Solution—Shall Street Cars be Elevated, Depressed or Abolished". In the course of his address, Mr. Osborne outlined the efforts of the Los Angeles Traffic Commission to relieve this congestion and some of the proposed suggestions and corrective measures which had been considered by the Commission.

The subject was also discussed by Messrs. Phil B. Harris, Charles K. Bowen, Franklin D. Howell, Samuel Storrow, W. D. Smith, H. R. Hilton, S. A. Jubb, C. H. Richards, W. W. Patch, R. L. Russell, J. N. Irving, R. P. Miller, and R. V. Orbison. Brief answers to the questions raised during the discussion were made by Messrs. P. B. Harris and C. K. Bowen, at the conclusion of which President Howell extended a vote of thanks to the speakers.

Several members of the Student Chapter at the California Institute of Technology were present and were greeted by President Howell who extended an invitation to all student members to attend future meetings of the Section.

In a brief address, President Howell thanked the membership for electing him President of the Section and asked the co-operation of the entire membership in behalf of the Section's future activities.

New Officers of the Los Angeles Section

At the Annual Meeting of the Section on December 13, 1922, the following officers were elected for the ensuing year: President, Franklin D. Howell; Vice-Presidents, W. H. Code and Franklin Thomas; Secretary, F. G. Dessery; Treasurer, E. R. Bowen; and Past-Presidents, H. W. Dennis and Ralph J. Reed.

Annual Meeting of the Nebraska Section

The Annual Meeting of the Nebraska Section was held on January 13, 1923, at the Hotel Victoria, Lincoln, Nebr.; President William Grant in the chair; Homer V. Knouse, Secretary; and present, also, 12 members.

The minutes of the 44th and 45th regular meetings of the Section were read and approved.

The Secretary presented a letter from Director J. N. Chester, relative to the establishment of a Benevolent Fund by the Society. After discussion of this matter by those present, it was the sense of the meeting that there should

be no modification of the motion carried at the 45th regular meeting of the Section endorsing the report of the Committee of the Board of Direction on this subject.

Mr. George E. Johnson called attention to the desirability for the introduction of a bill at the present session of the State Legislature, which would permit City Councils in States of the first class to construct sewage disposal plants and to issue bonds in payment for the same, without a vote of the people. After discussion of the subject, the opinion of the members being favorable to such a bill, the matter was referred to the Legislative Committee.

The following officers were elected for the ensuing year: President, George T. Prince; Senior Vice-President, John Latenser, Jr.; Junior Vice-President, H. P. Letton; and Secretary-Treasurer, Homer V. Knouse.

Director Frank T. Darrow presented an informal report of the Fall Meeting of the Society held at San Francisco, Calif., and discussed various matters that have been considered by the Board of Direction, calling particular attention to the medals and prizes that are offered annually, to the sectional meetings that are to be held during the coming year, and to the excellent work that is being done by the various Special Committees.

President Grant presented the Annual Address, in which he called attention to the necessity for the compilation of data pertaining to rainfall and run-off and for an extension of the work of investigation and study along these lines, with particular reference to conditions in the State of Nebraska.

Following the address, an extended discussion of the subject was had, and on motion, duly seconded, President-elect Prince was authorized to appoint a committee of three as a Rainfall and Run-Off Committee to make a preliminary survey and investigation of the subjects outlined by President Grant, and to formulate a policy whereby the Section could co-operate with the proper agencies in accomplishing the results desired.

The Secretary called attention to the desirability for a better plan for the arrangement of programs at the meetings of the Section, suggesting that the Senior and Junior Vice-Presidents be made responsible for such programs. Pending possible later action to amend the Constitution along this line, on motion, duly seconded, the Vice-Presidents-elect were instructed to consider as part of their duties the arrangement of the programs of the Section meetings.

Secretary Knouse announced that an "Engineer's Round Table" had been arranged for in Omaha, and that these luncheons were being held each Wednesday at the Brandeis Grill. Mr. Knouse also announced that invitations had been extended to all members of other engineering societies and to such engineers who are not members of any society to attend these luncheons.

Mr. A. L. Ogle was introduced by President Grant as a new member of the Section.

President Grant introduced President-elect Prince urging the greatest possible co-operation of the membership in making the year 1923 one of maximum benefit to the Section.

President Prince took the chair and, after a brief address, announced the appointment of the following committees for 1923: Legislative Committee:

H. P. Letton, Chairman; George L. Campen, George W. Bates; and Rainfall and Run-Off Committee: William Grant, Chairman, M. I. Evinger, C. E. Mickey.

Meetings of the New York Section

A meeting of the New York Section was held at the Engineering Societies Building on January 10, 1923; President J. Vipond Davies in the chair; Harold M. Lewis, Secretary; and present, also, 475 members and guests.

A letter was presented from M. Dumaine, representative in the United States of the Société des Ingénieurs Civils de France, stating that the rooms of the French Society at 19 rue Blanche, Paris, France, had been placed at the disposal of the members of the American Societies in France.

A letter from the Albany Society of Engineers was also presented, asking for co-operation in effecting a change in the proposed State Legislation relative to consolidating the offices of State Engineer and Surveyor, and Superintendent of Public Works, and to ensure that the incumbent be a professional engineer with not less than 15 years of engineering experience. On motion, duly seconded, this letter was referred to the Public Relations Committee for report to the Board of Directors.

It was announced that, in response to a request from the Secretary of the Society, the sentiment of the Section toward the proposed Benevolent Fund would be requested at the next meeting of the Society.

Gen. Jay J. Morrow, U. S. A., M. Am. Soc. C. E., Governor of the Panama Canal Zone, addressed the meeting on the subject of "The Operation of the Panama Canal". Gen. Morrow discussed the principal technical problems of operation; the water supply and the plans for increasing it when necessary; the capacity of the Canal for the increased traffic that is sure to come; the success of the fight against the slides; the advantages of the existing canal over a sea-level canal; the problems of sanitation, and of the housing, feeding, and governing of the employees; studies of the world's traffic routes resulting from information to date, etc. Gen. Morrow stated that much of the business success of the Panama Canal is probably due to its form of Government as centralized in the Governor under the Secretary of War, and called attention to the fact that all the Governors to date have been engineers.

Mr. Winthrop L. Marvin, Vice-President and General Manager of the American Steamship Owners Association, discussed the Panama Canal from the viewpoint of the shipping industry. Among other things, Mr. Marvin stated that the Canal's greatest contribution to commerce has been the expansion of trade between the Atlantic and Pacific ports of the United States.

Sub-Section Meeting, January 31, 1923

The fifth meeting of the Sub-Section on Design of the New York Section was held at the Engineering Societies Building on January 31, 1923; James H. Edwards, M. Am. Soc. C. E., in the chair; and present, also, about 75 members and guests.

The subject before the meeting was a continuation of the discussion at the previous meeting of the Sub-Section on November 15, 1922, on "Specifications for Steel Structures", with special reference to unit stresses.

The discussion was participated in by Messrs. D. B. Steinman, H. G. Balcom, Aubrey Weymouth, H. W. Troelsch, Shortridge Hardesty, J. P. Churchill, H. C. Keith, F. O. Dufour, F. E. Schmitt, W. E. Belcher, S. R. Jones, and J. C. Keith.

Annual Meeting of the Northeastern Section

The Annual Meeting of the Northeastern Section was held at the Boston City Club, Boston, Mass., on January 27, 1923; Chairman Frank B. Sanborn presiding; Charles W. Banks, Secretary; and present, also, 58 members and guests.

Chairman Sanborn made an informal report on the Annual Meeting of the Society, in New York City, on January 17-19, 1923.

The annual reports of the Secretary-Treasurer were, on motion, duly seconded, accepted as read. The Secretary announced the death of Frank W. Hodgdon, M. Am. Soc. C. E., on January 26, 1923, stating that Mr. Hodgdon was one of the charter members of the Section.

On motion, duly seconded, it was voted to adopt the amendment to Article 3, Section 1, of the By-laws of the Section as proposed by the Executive Committee.

The following officers were elected for the ensuing year: Chairman, Lewis E. Moore; Vice-Chairman, Arthur D. Weston; Secretary-Treasurer, Charles W. Banks; and members of the Executive Committee, Richard K. Hale, and William F. Uhl.

Mr. William F. Williams, Commissioner of the Massachusetts Department of Public Works, a guest at the meeting, spoke in appreciation of the life and work of the late Mr. Frank W. Hodgdon, after which he delivered an interesting address on the "Engineer in Public Affairs".

The next speaker was J. Parker Snow, M. Am. Soc. C. E., also a guest of the Section, who addressed the meeting on the need of a Metropolitan Planning Board, presenting a resolution relative to this matter. After discussion by Messrs. W. C. Voss, F. B. Sanborn, F. H. Fay, and Leonard Metcalf, the following resolution was, on motion, duly seconded, adopted:

"That the Northeastern Section of the American Society of Civil Engineers favors the position taken by the Chamber of Commerce regarding the necessity of a Planning Board for Metropolitan Boston."

On motion, duly seconded, it was decided to ask Mr. Snow and Professor George F. Swain to act with Chairman L. E. Moore as a committee of three to meet with a similar committee of the Affiliated Technical Societies and also to act at the hearing at the State House on February 1, 1923, relative to the work of a Metropolitan Planning Board.

Chairman Sanborn addressed the meeting on "The Fundamentals in Engineering Education".

The new Chairman, Mr. Moore, was introduced by Leonard C. Wason, Chairman of the Nominating Committee. Mr. Moore presented a few remarks, concluding with the statement to the effect that he would let performance speak rather than promises.

On motion, duly seconded, the Secretary was instructed to send to the family of the late Mr. Hodgdon a letter of condolence and of appreciation of his life.

Meeting of the Philadelphia Section

A meeting of the Philadelphia Section with the Engineers' Club of Philadelphia was held on January 30, 1923; President William Easby, Jr., of the Section, in the chair; and present, also, about 100 members and guests.

The subject for discussion was "Traffic Regulations in Cities" and among those who took part were Mr. Greene, President of the Automobile Club of Philadelphia; C. M. Pinckney, Chief Engineer of the Borough of Manhattan; William B. Mills, Superintendent of the Bureau of Police of Philadelphia; Miers Busch representing the Philadelphia Board of Trade; Gen. Charles D. Gaither, Commissioner of Police of Baltimore, Md.; W. J. Vanston, Director of the Department of Public Safety of Scranton, Pa.; and Mr. Chapman representing the Chestnut Street Business Men's Association.

Some very interesting ideas were brought out in the course of the discussion, among which were the enactment of legislation requiring applicants for drivers' licenses to be examined physically, mentally, and by practical tests; periodical examination of cars to see that brakes and operating mechanism are kept in good condition; compulsory insurance for protection of life and property; titles for cars and their recording by the State, with the requirement that titles be transferred on sale of cars; restriction of parking on business streets; the regulation of pedestrian as well as automobile traffic by municipalities; and the elimination of left-hand turns on principal lines of traffic.

Annual Meeting of the St. Louis Section

The Annual Meeting of the St. Louis Section was held at the Melbourne Hotel, on November 27, 1922; President E. B. Fay in the chair; William C. E. Becker, Secretary; and present, also, 20 members and 1 guest.

The minutes of the meeting of October 23, 1922, were read and approved.

The Secretary-Treasurer presented his Annual Report which, on motion, duly seconded, was also approved.

President Fay reviewed the activities of the Section during the year and the changes in membership.

The resolutions passed by the Detroit Section relative to the contribution of Society funds to the maintenance of an Employment Bureau were read, and after discussion, on motion, duly seconded, it was decided that the Section endorse the resolutions adopted by the Detroit Section if the facts are as stated therein.

A letter from E. E. Wall, Chairman of the Eads Memorial Fund Committee, was presented, in which it was stated that $450 had been subscribed by personal

solicitation from members in the Section. Mr. Wall also expressed his thanks to the members for their prompt and generous response to his request for funds.

The following officers were elected for the ensuing year; President, John T. Garrett; Vice-President, H. J. Pfeifer; Member of the Joint Council, Associated Engineering Societies, James C. Travilla; and Secretary-Treasurer, William C. E. Becker.

The report of the Section's members to the Joint Council was read, and after a full discussion of the subject, on motion, duly seconded, a committee was appointed to consider the report in detail and report back to the Section at the next meeting, together with a definite recommendation as to dues for 1923. President-elect Garrett subsequently appointed as such committee Messrs. William S. Mitchell, Chairman, W. E. Rolfe, C. D. Purdon, W. R. Crecelius, and E. J. Brockmeyer.

The following subject was then taken up for discussion, "Shall We Develop the Knowledge and Skill of Engineers in Order that We May Have Better and Greater Ship Canals or Shall We Build More Ship Canals in Order that We May Have Engineers of Greater Wisdom and Cleverness?"

New Officers of the San Diego Section

At the meeting of the San Diego Section held on January 16, 1923, the following officers were elected: President, J. R. Comly; Vice-President, George Cromwell; and Secretary-Treasurer, J. Y. Jewett.

Meeting of the Virginia Section

A Joint Meeting of the Virginia Section with the Sections of the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the Norfolk, Newport News, and Richmond Chapters of the American Association of Engineers, was held at the Virginia Military Institute, Lexington, Va., on November 24 and 25, 1922.

The meeting of November 24, 1922, was called to order at 10:00 A. M.; President J. C. Carpenter, of the Section, in the chair.

In a brief introductory address, it was stated that the meeting had been arranged as a Highway Meeting, and that the majority of the papers to be presented would be on highway subjects.

An address of welcome was presented by General E. W. Nichols, Superintendent of the Virginia Military Institute, on behalf of the Institute. In the course of his address, General Nichols presented a brief history of the Institute and the work that is being done there among the students.

H. K. Bishop, M. Am. Soc. C. E., Chief of the Division of Construction, U. S. Bureau of Public Roads, presented an interesting address on "Federal Highway Construction and Maintenance" in which he outlined the work done by the Bureau in co-ordinating the different State systems under the Federal Highway Act, and discussed several methods of maintenance and the control of maintenance of Federal Aid projects by the Bureau of Roads.

A paper by Charles M. Upham, M. Am. Soc. C. E., State Highway Engineer of North Carolina, entitled "Efficient Transportation in the Development of the Country", was presented by the author. Mr. Upham stated that the development of a State depends on its means of transportation which takes into consideration the cost of providing this transportation and its subsequent maintenance as well as the cost of operation.

Dana Q. McComb, M. Am. Soc. C. E., of Nashville, Tenn., presented an address on the subject "The Organization of a State Highway Department", in which he outlined the steps taken by the Tennessee State Highway Department in organizing its present engineering force, the members of which were selected on the merit system.

A paper on "Highway Bridges" was read by J. V. McNary, Assoc. M. Am. Soc. C. E., Senior Highway Bridge Engineer of the U. S. Bureau of Public Roads. Mr. McNary outlined the general changes in methods of bridge design which have taken place in the last few years and presented some suggestions as to the location of bridges and the value of esthetic treatment in connection therewith.

In reply to a request by President Carpenter for an address, Frederick S. Greene, M. Am. Soc. C. E., Highway Commissioner of New York State, addressed the meeting, directing his talk principally to the engineering students of the Institute of which he is an alumnus. He expressed his views as to the policy to be followed in selecting the type of pavement for a modern highway, and presented some comparative figures on maintenance of various types and also a brief history of patrol maintenance in New York State.

The meeting adjourned at 1:15 P. M.

The afternoon session was called to order by Dean W. M. Thornton, of the University of Virginia.

After some preliminary announcements, Dugald C. Jackson, M. Am. Soc. C. E., Professor of Electrical Engineering at the Massachusetts Institute of Technology, presented an interesting address on "Engineering Education".

In connection with the address on "Engineering as a Preparation for Life", by Professor J. E. Howe, of Washington and Lee University, the drafting instruments that were used by General Robert E. Lee were exhibited.

The meeting adjourned at 4:00 P. M.

The evening session was called to order at 8:30 P. M.; President J. C. Carpenter in the chair.

Mr. Dana Q. McComb continued his talk on "The Organization of a State Highway Department", illustrating his address with slides showing the chart of organization used by the Tennessee State Highway Department and several forms for recording the qualifications of an employee and his merit as determined by analysis and grading.

A paper on "History, Manufacture, and Uses of Portland Cement", was presented by George A. Ricker, M. Am. Soc. C. E., former State Highway Commissioner of New York, who illustrated his talk with lantern slides.

Following Mr. Ricker's paper, two films on "Modern Concrete Road Construction" and "High Roads and Sky Roads", loaned by the U. S. Bureau of Public Roads, were shown.

Meeting of November 25, 1922

The joint meeting held on November 25, 1922, was called to order by H. G. Shirley, M. Am. Soc. C. E.

Mr. Shirley read a telegram from Governor Trinkle expressing regret that he was unable to be present at the meeting.

President Henry Louis Smith, of Washington and Lee University, presented an address on "The Needs of Virginia for Highways".

A talk on "Highway Finance" was presented by Mr. Pyke Johnson, of the National Automobile Chamber of Commerce, in which he emphasized the need for general bond issues and the satisfying of the elemental human desire for individual transportation.

A paper on "The Relations of the Engineer to the Public", by A. N. Johnson, M. Am. Soc. C. E., who was unable to be present at the meeting, was read by Dr. Taliafferro, of the University of Maryland. Dean Johnson emphasized the fact that the engineer's responsibility is not discharged through his technical work alone, but that with such work must be combined community interest and service.

Mr. Frank Moore, representing the Lexington Rotary Club of Lexington, Va., outlined the road situation in Rockbridge County, Virginia, presenting in detail the present needs of the county in regard to highway work.

President Carpenter announced the date and subject of the next meeting, stating that the Richmond Chapter of the American Association of Engineers would present several papers and a film on "Zoning."

A resolution of thanks to the Virginia Military Institute for its hospitality and the effort that had been put forth to make the meeting a success was, on motion, duly seconded, passed unanimously.

Entertainments at Meeting of November 24-25, 1922

After the adjournment of the meeting, on November 24, 1922, the members and guests were entertained by modern drill exercises and a dress parade by the Cadet Corps of the Virginia Military Institute, and at 7:30 P. M. a banquet was served in the Cadet Mess Hall.

From 1:30 to 2:00 P. M., on November 25, 1922, was spent in an inspection of the grounds and laboratories of the Virginia Military Institute.

After luncheon, which was served at 2 P. M., in the Mess Hall, the members and guests were taken in automobiles, provided by the Lexington Rotary Club, to the tombs of Generals Lee and Jackson and to the Natural Bridge, and about 50 engineers were guests of the Natural Bridge Company, over night.

MINUTES OF MEETINGS
OF THE SOCIETY

REPORT IN FULL OF THE SEVENTIETH ANNUAL MEETING, JANUARY 17, 1923.

Wednesday, January 17, 1923 (10 A. M.).—The Seventieth Annual Meeting was called to order in the Auditorium of the Engineering Societies Building, 33 West 39th Street, New York City; President John R. Freeman in the chair; John H. Dunlap, Secretary; and present, also, about 438 members and guests.

THE PRESIDENT.—The hour for which this meeting was called has arrived and a quorum is present, therefore, the meeting is legally constituted. We have a very long program. First, I may announce that Tellers for counting the ballots for the election of officers of the Society have been appointed; H. P. Hammond, Assoc. M. Am. Soc. C. E., is Chairman, and he has impressed about twenty members to assist him, because they have a very strenuous job to open all those thousands of envelopes this morning without previous listing, as required by the new constitution, and have the announcements ready by noon. Their report will be ready for presentation to you before the close of this meeting.

The first matter in order is the report of the Board of Direction, which I will ask the Secretary to read. This report is in print and copies are available.

(The Secretary presented the report of the Board of Direction.*)

THE PRESIDENT.—It is customary to move to receive this report and place it on file.

(So moved, seconded, and carried.)

THE PRESIDENT.—The next matter in order is the report of the Secretary.

(The Secretary presented an abstract of his report.†)

THE PRESIDENT.—What is your pleasure? That this report be received and placed on file?

(So moved, seconded, and carried.)

THE PRESIDENT.—The next matter is the report of the Treasurer.

THE TREASURER.—Mr. President and Gentlemen, most of the detail figures in the Treasurer's report‡ have already been presented in the Secretary's report, so that I do not think it is necessary to repeat them, particularly as the whole report has been printed.

Among the outstanding receipts during the year, which are out of the ordinary, was a part of the legacy of the late Hiram F. Mills, Hon. M. Am. Soc. C. E., amounting to $1 000.

Among the new expenses was the charge for Local Sections, amounting to $2 886.

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* See p. 140.
† See p. 152.
‡ See p. 156.

Also, alterations to a vault on account of widening the street at 220 West 57th Street, amounting to $4 174.82, and the purchase of about $25 000 worth of 4¼% Liberty Loan bonds.

In connection with this purchase, I have called attention in my report to the recommendation of a committee of the Board of Direction on January 15, 1917, that as soon as funds were available, the trust funds of the Society be given further protection by additional investment, and it is worthy of note that this purchase of Liberty Loan bonds, combined with bonds in the possession of the Society, amply complies with this recommendation, so that the trust funds are offset by definite bonded investments.

THE PRESIDENT.—What is your pleasure, Gentlemen, that this report be received and placed on file?

HENRY B. SEAMAN, M. AM. SOC. C. E.—I so move.

(Motion seconded and carried.)

THE PRESIDENT.—We will now pass to reports of Special Committees. We have such a large number of these reports, that although some of them are of particular importance, and one of them is, I think, epoch-making, we shall have to ask the Chairmen of the committees to present abstracts touching only on the "high spots" and to try to confine their remarks to five minutes.

I shall first call on Mr. Robert A. Cummings, Chairman of the Special Committee to Codify Present Practice on the Bearing Value of Soils for Foundations.

(Mr. Cummings presented the Progress Report of the Committee.)

ROBERT A. CUMMINGS, M. AM. SOC. C. E.—I move you, the adoption of the report and the continuation of the Committee.

THE PRESIDENT.—I feel that this is one of our epoch-making reports by reason of its recognition that in the study of many difficult foundations assistance is needed from students of colloids. It has been evident to a great many engineers for some time that we have to consider ultra-microscopic matter and the latest refinements of physical chemistry, and this report, as far as I know, is the first that gives prominent recognition to that new field of inquiry in relation to pressures and reactions of earth and foundations.

C. E. GRUNSKY, M. AM. SOC. C. E.—I move, Mr. Chairman, that the report be received, and that the Committee be thanked for the work which it has accomplished and the results presented, which appear to be so satisfactory.

(Motion seconded.)

THE PRESIDENT.—You have heard the motion, which has been duly seconded. Those in favor will say "aye"; contrary minded, "no". The motion is carried and the Committee continued.

I have been separating some colloidal matters from Mississippi soil myself lately; and it has been very impressive to see what proportion they form and the part that they may play in lessening stability.

Two years ago, in following up some work of Allen Hazen, M. Am. Soc. C. E., in California, and experimenting with some apparatus which Mr. Hazen had assisted in designing for measuring the coefficient of friction or resistance to shear or to sliding while under great pressure, I was much interested to find

sudden changes in the coefficient of friction, as I now recall, of about 30 or 35% down to 15%, for reasons which are obscure, but which probably come within the realm of inquiry of the molecular physicist and may explain certain landslides and earth dam failures. This action of colloids in earth pressure and slip is a very important subject, and I hope the Committee will feel encouraged to continue its studies.

The next report in order is that of the Special Committee on Stresses in Railroad Track, Professor Arthur N. Talbot, Chairman.

ARTHUR N. TALBOT, PAST-PRESIDENT, AM. SOC. C. E.—Mr. President and Gentlemen: This report is in print and I shall call attention only to what it covers.

(Past-President Talbot presented an abstract of the Progress Report of the Committee.*)

PAST-PRESIDENT TALBOT.—Mr. President, I move that the report be received and printed.

(Motion seconded.)

THE PRESIDENT.—It is moved and seconded that the report be received and printed in *Transactions*. Those in favor of the motion will say "aye"; contrary minded, "no". The motion is carried. It is a Progress Report, and the Committee is automatically continued.

Next in order is the Progress Report of the Special Committee on Highway Engineering. Mr. H. Eltinge Breed is Chairman of that Committee, but as he is not able to be present, the Secretary will read the report.

THE SECRETARY.—The report is as follows:

"PROGRESS REPORT OF
SPECIAL COMMITTEE ON HIGHWAY ENGINEERING

"Last year the report of your Special Committee on Highway Engineering related chiefly to the functioning and co-operation of the Federal Bureau of Public Roads and the State Highway Departments. At that time it was recommended that the Society approve of certain appropriations which were in prospect for Federal Aid Roads. If it seems certain that this basis of Federal Aid will be continued during the coming year, your Committee sees no necessity of recommending any action at this time. However, the time might come when the aid of the Society will be desirable in furthering this cause.

"Respectfully submitted,

"By H. ELTINGE BREED, *Chairman*."

THE PRESIDENT.—This is a Progress Report. The next in order is the Final Report on Specifications for Design and Construction of Steel Railway Bridge Superstructure of the Special Committee on Bridge Design and Construction, Mr. Henry B. Seaman, Chairman.

MR. SEAMAN.—The Tentative Specifications for Steel Railway Bridges,† which were submitted with the report of the Committee at the Annual Meeting of the Society on January 18, 1922, have been fully discussed, and the specifica-

* See Papers and Discussions, p. 295.

† *Proceedings*, Am. Soc. C. E., December, 1921, p. 683.

tions presented herewith are the result of the Committee's interpretation of such discussion.

(Mr. Seaman presented the Final Report on Specifications for Design and Construction of Steel Railway Bridge Superstructure of the Special Committee on Bridge Design and Construction.*)

MR. SEAMAN.—I move that the report be received and placed on file. I would also like to add that the Committee has held a meeting at which it considered the Tentative Specifications for Steel Highway Bridges, and has practically completed that work. It will undoubtedly have a final report on that subject ready for presentation to the Annual Meeting of 1924.

(Motion seconded.)

THE PRESIDENT.—You have heard the motion that the report be received and placed on file. Those in favor will say "aye"; contrary minded, "no". The motion is carried.

The next in order is the Progress Report of the Special Committee on Contract Standard Clauses. Mr. H. Eltinge Breed, the Chairman of the Committee, is not here and the report will be presented by Mr. Langthorn.

J. S. LANGTHORN, M. AM. SOC. C. E.—Mr. President and Gentlemen: I have here a purely formal Progress Report, which briefly is as follows:

"PROGRESS REPORT ON
GENERAL FORM OF CONTRACT STANDARD CLAUSES

"Your Special Committee on General Form of Contract Standard Clauses would at this time report only as to progress.

"During the year delegates from your Committee have attended meetings of the Joint Conference giving such time as would assist in formulating the tentative drafts of 'A Proposed Universal Form of Contract Agreement as Applied to Building Work and as Applied to Railroad Work.'

"The representation at these meetings was in behalf of the following: American Association of State Highway Officials, American Society of Civil Engineers, American Institute of Architects, American Water Works Association, American Railway Engineering Association, Associated General Contractors of America, Federated American Engineering Societies, National Association of Builders Exchanges, Western Society of Engineers.

"The purpose of the meetings has been to draft a universal contract agreement, discuss the same, revise it in such form as would best suit the needs of all concerned in order that it may be presented to the member societies of the Joint Conference.

"With the final revision of the tentative draft there will be a presentation of it to the Society so that an opportunity for discussion may be had. The report of the Committee on this work and such recommendations as it may have will be made as soon as the last tentative draft is ready.

"H. ELTINGE BREED, *Chairman.*"

Mr. President, I move that the report be accepted, and that the Committee be continued.

(Motion seconded.)

THE PRESIDENT.—Gentlemen, you have heard the motion, which is duly seconded. Those in favor will say "aye"; contrary minded, "no". It is a vote. The Committee is continued.

* *Proceedings*, Am. Soc. C. E., January, 1923, Papers and Discussions, p. 53.

The next is the report of the Alfred Noble Memorial Committee, Mr. Samuel Rea, Chairman.

THE SECRETARY.—Mr. President, I desire to make the following report on behalf of the Alfred Noble Memorial Committee:

"PHILADELPHIA, December 18, 1922.

"AMERICAN SOCIETY OF CIVIL ENGINEERS,
33 West 39th Street, New York City.

"GENTLEMEN.—I desire to make the following progress report on behalf of the Alfred Noble Memorial Committee, for presentation at the forthcoming Annual Meeting of the Society.

"The Committee has held several meetings during the year, and progress has been made in the determination of a final design for the Memorial Fountain to be placed in Rawlins Square in the City of Washington. The unsatisfactory business conditions in the past, which have prevented the completion of the Memorial, seem to be improving, and it is the intention of the Committee to shortly prepare and submit an appeal for subscriptions to the members of the American Society of Civil Engineers, and to many persons engaged in allied professions, so that this worthy project may be completed.

"During the year Mr. Hugh L. Cooper resigned from the Committee and Mr. George S. Webster retired when Mr. John R. Freeman was elected President of the Society, and the latter is now *ex-officio* a member of the Committee. Mr. J. Waldo Smith succeeded Mr. Cooper, so that the Committee is now made up as follows: Samuel Rea, *Chairman;* John R. Freeman (*ex-officio*); George Gibbs, William W. Harts, S. H. Hedges, F. H. Newell, J. Waldo Smith, Onward Bates, Robert Ridgway, *Secretary and Treasurer.*

"Respectfully submitted,

"SAMUEL REA, *Chairman.*"

THE PRESIDENT.—The Progress Report of the Alfred Noble Memorial Committee is before you, Gentlemen. What action will you take?

(It was moved and seconded that the report be received and placed on file.)

THE PRESIDENT.—Those in favor will say "aye"; contrary minded, "no". It is so voted.

The Special Committee on Industrial Education, Mr. Herman Schneider, Chairman. Mr. Schneider is unable to be present. Mr. Mehren will report for him.

E. H. MEHREN, M. AM. SOC. C. E.—Mr. Schneider has not transmitted his report to me, I am sorry to say. He was to have prepared it.

THE PRESIDENT.—I call for the report of the Special Committee on the Electrification of Steam Railroads, Mr. Charles F. Loweth, Chairman.

ROBERT RIDGWAY, M. AM. SOC. C. E.—The report is brief, and I will read it.

(Mr. Ridgway read the Progress Report* of the Committee.)

MR. RIDGWAY.—I move that the report be received as a Progress Report.

(Motion seconded.)

THE PRESIDENT.—It is moved and seconded that this report be received as a Progress Report. Those in favor will say "aye"; contrary minded, "no". It is received.

* See Papers and Discussions, p. 488.

I next call for the report of the Special Committee on Stresses in Structural Steel, Mr. F. O. Dufour, Chairman.

THE SECRETARY.—Mr. President, I have a copy of the report, which I will read, unless some other member of the Committee is here. The report is as follows:

"PROGRESS REPORT OF
SPECIAL COMMITTEE ON STRESSES IN STRUCTURAL STEEL

"EASTON, PA., December 11, 1922.

"TO THE BOARD OF DIRECTION,
AMERICAN SOCIETY OF CIVIL ENGINEERS:

"The following is the report of the Special Committee on Stresses in Structural Steel for the year 1922.

"1.—The Committee has held one meeting.

"2.—The Committee decided not to investigate such structural steel, the origin of which is not known, that may be carried in warehouses or fabricating plant stocks, and that it would for the present confine its activities to the quality of structural steel for buildings as specified by the American Society for Testing Materials.

"3.—It was not considered feasible for the Committee to start conducting extensive measurements at this time in order to determine stresses in existing building frames, but that it could first investigate the physical properties of commercial structural steel.

"4.—A committee consisting of Messrs. Masters, Chase, and Fogg was appointed to arrange a tentative program for the investigation of the physical properties of commercial structural steel, and a committee consisting of Messrs. Edwards, Schmitt, and Rights was appointed to look into the matter of working stresses, having in mind the possibility of raising the present value, and both these committees were requested to report at the next meeting which was decided would be in New York on December 8th at the Headquarters of the Society.

"Very truly yours,

"F. O. DUFOUR, *Chairman.*"

THE PRESIDENT.—What is your pleasure, that this Progress Report be received and placed on file?

(It was moved, seconded, and carried that the report be received and placed on file.)

THE PRESIDENT.—I next call for the report of the Special Committee on Flood Protection Data, Mr. N. C. Grover, Chairman.

N. C. GROVER, M. AM. SOC. C. E.—The report of the Special Committee on Flood Protection Data is as follows:

"PROGRESS REPORT OF
SPECIAL COMMITTEE ON FLOOD PROTECTION DATA

"Notices of the appointment of this Committee were sent to the individual members on August 9th, 1922. The Chairman was notified on September 6th that all members had accepted.

"No meetings of the Committee have been held, but an attempt has been made to start its work by correspondence. This has been found to be slow and unsatisfactory because of the nation-wide field of the Committee's work, in

which rivers of great diversity of characteristics must be considered, of various points of view arising from observation or study of rivers of different habits, and of the resulting natural differences of opinions held by the members of the Committee. Progress has been made, however, in defining the work of the Committee and especially in reaching an agreement as to the definition of a flood and the limiting criteria to be used in the compilation of flood data.

"Respectfully submitted,

"N. C. GROVER,

"Chairman, Committee on Flood Protection Data."

"NOVEMBER 28, 1922."

THE PRESIDENT.—Is it your pleasure that this Progress Report be received and placed on file?

(It was moved, seconded, and carried that the report be received and placed on file.)

THE PRESIDENT.—I next call for the report of the Special Committee on Impact in Highway Bridges, of which Professor Almon H. Fuller is Chairman. The report will be presented by Dean Anson Marston.

ANSON MARSTON, M. AM. SOC. C. E.—It is rather embarrassing to have to present the report of a committee of which one is not a member, and with the work of which one has not been very closely in touch; but there are some advantages in being able to speak from the outside about the work of the Committee.

(Dean Marston presented the Progress Report* of the Committee.)

DEAN MARSTON.—I move that this report be received as a Progress Report and placed on file.

THE PRESIDENT.—Gentlemen, you have heard the motion, which has been seconded. Those in favor will say "aye"; contrary minded, "no". The motion is carried.

The next matter in order is the conferring of Honorary Membership. The first on whom Honorary Membership is to be conferred is M. Léon-Jean Chagnaud, of Paris, France, who, in 1921, was President of the Society of Civil Engineers of France, and who is famous all over the world as an engineer and builder of difficult tunnels. About twelve years ago, I had an opportunity to inspect the wonderful tunnel which he was building under the Bernese Oberland. The Loetschberg Tunnel from Brig to Kandersteg on which the most rapid progress was made that has ever been made anywhere in the world, was largely due to his new methods.

A year ago I had the opportunity of seeing a still more wonderful work in progress, which was under his charge, that of the great tunnel of the Marseilles Canal. I think nowhere in the world has anything on such an heroic scale been attempted. The design and execution were admirable in every way. I had also the pleasure of accompanying M. Chagnaud and a group of engineers on a week's tour through Southeastern France, and then had an opportunity to note the high esteem in which he was held by his brother engineers and to appreciate the charm of his personality.

* See Papers and Discussions, p. 457.

ALEXANDER C. HUMPHREYS, M. AM. SOC. C. E.—Mr. President, it is my privilege to present M. Léon-Jean Chagnaud for Honorary Membership in this Society, through His Excellency, Jules J. Jusserand, Ambassador, Ambassador Jusserand being represented by Captain Lombard, Assistant Military Attaché to the French Embassy.

Léon-Jean Chagnaud was born at LeBourg d'hem, in the Department of the Creuse, France. In 1881, he entered the Ecole des Arts et Mętiers at Chalons sur Marne.

Soon after his graduation he reconstructed the locks of the Canal du Centre; established the massive concrete fortifications about Toul; and also built 11 km. of strategic roads between Vitry and Blesmes.

Charged with the execution of subterranean excavation in the center of Paris and beyond, in connection with one of the large trunk sewers, a work carried on at a minimum depth of 1 m. below the surface and without interruption of traffic, he was in large measure responsible for the development of the modern method of shield tunneling for subterranean and subaqueous excavation. This was the first use of this method in Paris.

The tunnels for crossing the Alps at Loëtschberg and Moutier-Longeau were planned and executed by M. Chagnaud, an undertaking of great difficulty because of the danger from avalanches.

On the construction of the Metropolitan Line No. 4 in Paris, from the Porte de Clignancourt to the Porte d'Orleans, crossing under the two branches of the Seine, he sank huge shafts at two of the stations, which were constructed as caissons and later utilized to form the permanent linings. For the execution of this difficult undertaking, which required freezing of the soil and injections of cement in certain sections, he was honored by the Prix Berger and the bestowal of the Legion d'Honneur.

M. Chagnaud has served the State as a member of the Senate, and, in 1921, was President of the Société des Ingénieurs Civils de France.

On his record of distinguished services as an engineer, which I have so briefly summarized, I ask you to confer upon Léon-Jean Chagnaud, through His Excellency, Ambassador Jusserand, here represented by Captain Lombard, Assistant Military Attaché to the French Embassy, Honorary Membership in the American Society of Civil Engineers.

THE PRESIDENT.—On behalf of the Society, I ask you to transmit this certificate of Honorary Membership to M. Chagnaud.

CAPTAIN LOMBARD.—Mr. President, Members of the American Society of Civil Engineers: The French Ambassador, M. Jusserand, has asked me to convey to you his sincere regret at not being able to attend your meeting to-day. He has also asked me to express to you the heartfelt gratitude of the French Government for the high appreciation you show for the services that M. Léon-Jean Chagnaud, our countryman, has rendered to engineering science. I shall not enlarge upon what a more qualified speaker than myself, Mr. Humphreys, has said, but may I add that such tokens of sympathy and high esteem granted by the foremost learned societies of your country to our prominent men can but tighten the bonds of deep and lasting affection that

exist between the United States and France. Let me thank you once more for conferring the Honorary Membership on M. Chagnaud, a high distinction of which scientific bodies in France and more particularly the French Society of Civil Engineers will be proud.

THE PRESIDENT.—The next candidate for Honorary Membership is Sir Maurice Fitzmaurice, of London, England. Many of our fellow members who have had occasion to go abroad, have experienced the courteous hospitality of Sir Maurice Fitzmaurice. A year ago, I had the pleasure of seeing him preside at a meeting of the Hydraulic Section of the Institution of Civil Engineers, and was greatly impressed with his personality and with the accounts that I heard from his brother engineers of his work in many lines. I ask Mr. Nelson P. Lewis to present his representative.

NELSON P. LEWIS, M. AM. SOC. C. E.—Mr. President, I have the honor to present to you Captain Gloster Armstrong, His Majesty's Consul-General at New York, who, by designation of His Excellency, the British Ambassador, represents Sir Maurice Fitzmaurice, in order that you may officially consummate the action of the American Society of Civil Engineers in having bestowed upon him its Honorary Membership, the greatest honor it is within its power to grant.

Sir Maurice Fitzmaurice has been very closely identified with many of the engineering undertakings which have been carried out in London during recent years. In 1901, he became Chief Engineer of the London County Council, and, in that capacity, he had much to do with the building of bridges over, and the driving of tunnels under, the Thames, the extension of the main drainage system, the creation of the electric tramway system, the planning and execution of the "Strand to Holborn" improvement, and many other projects carried out in the Metropolitan District.

His professional activities, however, have not been confined to London. His talents have been requisitioned by other places and by the Kingdom in the execution of public works for the improvement of transportation and commerce, and for National safety and defense. Canada and Australia have called for and received his advice upon railway and harbor development, and he has acted as Consultant with respect to the Suez Canal and the Assouan Dam.

During the World War, the Government availed itself of his demonstrated professional and executive capacity. He became Lieutenant Colonel in the Engineer and Railway Staff Corps and rendered valuable service, both at home and in Flanders. Fortunately, his writings provide a permanent record of some of the great undertakings with which he has been connected, more especially the bridges and the London Main Drainage System.

The wide extent of his activities and interests is indicated by his membership, active and honorary, in many professional and learned societies. He has served as President of the Institution of Civil Engineers, which has bestowed upon him both the Telford and the Watt Gold Medals. Knighted in 1912, he has received numerous decorations, medals, and degrees, and I venture, Mr. President, and Captain Armstrong, to express the hope that among

these not the least valued by him will be the Honorary Membership in the American Society of Civil Engineers conferred in recognition of his personal qualities and his high professional attainments, and in the bestowal of which the Society has honored itself as well as him.

THE PRESIDENT.—On behalf of the Board of Direction of the American Society of Civil Engineers, I bestow Honorary Membership in the Society on Sir Maurice Fitzmaurice, with our deep appreciation, and beg you to transmit this certificate to him.

CAPTAIN GLOSTER ARMSTRONG.—My Ambassador has asked me to express to your Society his deep regret at not being able to be here to-day owing to official duties which have detained him in Washington.

On behalf of Sir Maurice Fitzmaurice, I return thanks for the very distinguished honor conferred upon him. I shall transmit to him a memorandum of these proceedings, which will be appreciated not only by him, but by every Briton in the Empire.

THE PRESIDENT.—The next name in order is that of one whom we have all honored for many years, one of our own Past-Presidents. My personal contacts date back 50 years, beginning in my student days, and I recall his writings on many and varied topics as an inspiration. We have no one among us who is more a master of clear and vigorous language, or who has more ability to set things forth in a vivid way so as to stimulate the imagination of the young engineer. I recall half a dozen of his technical papers that have lingered in my memory, with their main points so clear that there is no need to refer to the books in which they are written. I ask Mr. J. Waldo Smith to present the candidate, Mr. Clemens Herschel.

J. WALDO SMITH, M. AM. SOC. C. E.—Mr. President, and Members of the American Society of Civil Engineers: It is a privilege and a high honor to introduce the man who was one's "boss" for very many years, and through whom the most important part of one's engineering education was received. The inventor of the Venturi meter, a device that has done more for the waterworks' engineer in assisting him to make a rational delivery of water, to conserve the supply, and eliminate waste, than any other improvement of a century; the constructor of the famous Holyoke test flume, a pioneer development which has made possible the continued development of turbines along scientific lines as well as the accurate measurement of water passing through them; a talented and resourceful designer of great hydraulic works; a forceful and concise writer on engineering subjects; a man at all times interested in the public welfare and taking a prominent part in the effort to stamp out what is wrong and deceitful, and to maintain with a strong hand what is right and beneficial.

Mr. President, Clemens Herschel, eminent engineer, inventor, constructor, author, linguist, and expert in hydraulics and hydrostatics, Past-President of the American Society of Civil Engineers, well known and distinguished throughout the world, stands before you to receive Honorary Membership in our Society.

CLEMENS HERSCHEL, PAST-PRESIDENT, AM. SOC. C. E.—Mr. President and Members of the American Society of Civil Engineers; I thank the gentlemen who have seen fit to nominate me for this high honor, and I thank all the members who have given it their approval here and at other times.

THE PRESIDENT.—The next name in order of those considered by the Board of Direction for this high honor is that of Mr. John Frank Stevens, one of our pioneer railroad builders and a man who has long been doing most distinguished work in the four corners of the earth, the most recent being as Manager of the Chinese Eastern Railroad, with headquarters at Harbin, Manchuria.

I happened to have the honor of meeting him in Peking not long ago, and I heard more of the difficulty and success of his work than he told me, from Chinese officials and from Russians. I think he has had one of the most difficult jobs in the whole world in operating that road, but he has carried it on in a way that has earned the profound admiration of all who know about it. It was undertaken in a high spirit of patriotism and steadfastly continued for the good of humanity.

I also happened to be with our great and good friend, the late Alfred Noble, Past-President, Am. Soc. C. E., at Panama, at the time when the work was turned over from the Civil to the Military Authority, and I think it was the judgment of all those who were familiar with that work at that time and with the success to which he had then brought it out of many early difficulties, that Mr. Stevens was the real builder of the Panama Canal.

WILLIAM BARCLAY PARSONS, M. AM. SOC. C. E.—Mr. President, transportation facilities that provide for the prompt transport and delivery of material are the very essence of success in the execution of great engineering works. The short time required for the completion of the Panama Canal and its low unit cost were due to the layout of the railway tracks for the removal of the excavated material from the steam shovels.

This admirable work was conceived and planned by an engineer who has served as Chief Engineer and as General Officer of many of the great railway systems, in both the eastern and western parts of the United States. At the outbreak of the World War, the American Government selected this great engineer to go to Russia to study the railway needs of that country. Following the unfortunate military collapse of Russia, this engineer realized that the time might come when it would be necessary to form a new front in the Far East. He, therefore, patriotically and unselfishly buried himself in Manchuria to study the local railway problems, so that should the occasion arise for the Allies to enter Europe through the back door, there would be an American there with the key to unlock it.

It is now my pleasure and my privilege to present to you this same engineer and gentleman to receive at your hands Honorary Membership in our Society, the highest honor the Society has it in its power to bestow—John Frank Stevens.

JOHN FRANK STEVENS, M. AM. SOC. C. E.—Mr. President and Members of the American Society of Civil Engineers: It is peculiarly gratifying to receive this great honor from the Society at the hands of our President, by one

who has practically completed nearly a half century of intensive, active engineering work, and I may add, who hopes to add several years to that long record.

Especially is it gratifying to me that this honor is bestowed on me immediately upon my arrival from nearly six years' strenuous efforts in war service in Russia and Manchuria; and I think I may take it as a welcome home to my native land after my long expatriation, and a welcome from my brother engineers.

Mr. President, my poor words are not sufficient to convey my appreciation of this honor, but such as they are, I thank you and the Society through you for this great honor.

THE PRESIDENT.—The next name on the list selected for notable achievement by the Board of Direction is a name that 30 or 40 years ago was exceedingly dear to young engineers, as one who wrote books that they could understand, and who was ever an inspiration toward the scientific investigation of fundamental facts. I shall ask Professor Swain to tell us something of the works of William Cawthorne Unwin, of London, England.

GEORGE F. SWAIN, PAST-PRESIDENT, AM. SOC. C. E.—It is the privilege of a Society like this to honor itself by honoring men who have been leaders of the profession. Such an act is most admirable. To honor great men benefits both the giver and the receiver. One of the things most necessary for Society progress is to recognize and admire superiority rather than to regard it with envy and to seek to detract from it, a state of mind only too common in these days. I have to present to-day the name of a man who was an outstanding figure in our profession when almost all of us here were either children or were not yet born.

William Cawthorne Unwin was born in Essex, England, in 1838, almost exactly eighty-four years ago. He had the great advantage of being obliged to struggle for an education, and under the system then in vogue in England was a pupil of Sir William Fairbairn, one of the leaders who, in the early days of the modern system of industry, laid the foundations for the industrial use of iron. In laying this foundation, therefore, Professor Unwin had a part, and one of his earliest published works was that on "Wrought Iron Bridges and Roofs". His other works, those on machine design, on the testing of materials, on the development and transmission of power from central stations, and on hydraulics, as well as his contributions to the Encyclopedia Britannica, are well known to us. From the beginning Professor Unwin has been a leading figure in engineering, and his name is known and respected wherever the history of engineering is known. As manager of works, as author, teacher, investigator, engineer, as member of important engineering commissions, such as that on the utilization of the power of Niagara Falls, as the recipient of many honors in his own country, including the Kelvin Medal in 1921, as member of the Council of the Royal Society, and as Past-President of that oldest of engineering societies, the Institution of Civil Engineers of Great Britain, and also as Past-President of the Institution of Mechanical Engineers, he has shed luster upon his chosen vocation and contributed to its high renown;

while his modesty, temperateness and balance of mind, courtesy, and fairness have endeared him to all who have had the privilege of his personal acquaintance.

It is, therefore, with peculiar pleasure that I present to you to receive the distinction of honorary membership in this Society, the name of Professor William Cawthorne Unwin, a leader for half a century in the field of Civil and Mechanical Engineering, and that I introduce to receive this honor, for Professor Unwin, His Majesty's Consul General of New York, Captain Gloster Armstrong, who comes as a representative designated by His Majesty's Ambassador to the United States, His Excellency Sir Auckland Geddes.

THE PRESIDENT.—On behalf of the Board of Direction and the American Society of Civil Engineers, we confer on William Cawthorne Unwin Honorary Membership in the American Society of Civil Engineers. Several here remember the courtesy with which he welcomed our delegation of American engineers, thirty-four years ago, and there also are those here who remember that same kindness with which he welcomed a delegation of this Society that visited London a year ago to convey the John Fritz Medal and the words of fraternal greeting and appreciation from American to British Engineers.

CAPTAIN ARMSTRONG.—Mr. President, again I express the regret of my Ambassador at not being here on this memorable occasion. I am sure that it will cheer the recipient of the Honorary Membership, Professor Unwin, in his old age, to hear of the flattering reference made to his great work, and that he and every man in my country will feel that a great honor has been conferred on him to-day, tightening the bonds that exist between the great English-speaking people of this country and the British Empire—those great English-speaking peoples upon whom so much depends in the future for the co-operation, the benefit, the peace, and the happiness of the world.

THE PRESIDENT.—The next in order is the award of Medals and Prizes: First, that of our most ancient and honorable medal, the Norman Medal, to Charles H. Paul, M. Am. Soc. C. E., of Dayton, Ohio, for Paper No. 1502,* "Core Studies in the Hydraulic-Fill Dams of the Miami Conservancy District." Mr. F. W. Scheidenhelm will present Mr. Paul.

F. W. SCHEIDENHELM, M. AM. SOC. C. E.—Mr. President and Gentlemen: It is a special pleasure to participate in this, which I understand is the first, award in public of medals and prizes of the Society. It is further with special pleasure that I recall my first contact with the gentleman whom I am about to present. It was in the summer of 1915 when I had occasion to visit the Boise, Idaho, Project of the United States Reclamation Service. Mr. Paul was then Construction Engineer in charge of the Arrowrock Dam, the highest dam in America and probably in the world.

For about eleven years prior to that time, Mr. Paul had been in the employ of the Reclamation Service, mainly as Construction Engineer on projects in the Northwest. Prior to 1904, his experience had been on water supply and sewerage work in the East. From 1896 to 1900, he was with the Metropolitan Water Board of Massachusetts, and for the next four years he served with the

* *Transactions*, Am. Soc. C. E., Vol. LXXXV (1922), p. 1181.

Bureau of Filtration of Philadelphia, Pa. He then took up his work in the Far West.

On the successful completion of the construction of the Arrowrock Dam, late in 1915, he returned to the East, this time to serve the Miami Conservancy District at Dayton, Ohio, first as Construction Engineer, then as Assistant Chief Engineer, and, finally, as Chief Engineer.

The principal structures in that well known and well done work were five dams, constructed by the hydraulic-fill or sluiced earth method, and involving nearly 8 000 000 cu. yd. of earthwork.

The construction of hydraulic-fill dams is essentially an empirical matter. Sometimes results have been disastrous, indicating the need for better data. The design of the dams of the Miami Conservancy District was the result of the composite judgment of engineers of the East and the West, and the methods of construction continued to be under careful scrutiny throughout their construction. The work of the District is outstanding, because of its unusually great amount of worthwhile experimentation and the unusually important results which that experimentation have yielded. It was like a huge laboratory in which there were made tests, the value of which accrues to the entire engineering world.

Certain data with respect to these hydraulic-fill dams have been embodied in an excellent paper entitled "Core Studies in the Hydraulic-Fill Dams of the Miami Conservancy District."* The author of that paper was Mr. Paul and the Committee on the Award of Medals and Prizes of the Society has recommended him for the award of the Norman Medal, which, it is prescribed, must be awarded to the author of "a paper which shall be judged worthy of special commendation for its merit as a contribution to engineering science."

Mr. President, I have the honor and pleasure of presenting to you Mr. Charles Howard Paul for the award of the Norman Medal.

THE PRESIDENT.—Mr. Paul, it is with great pleasure, on behalf of the Board of Direction and your fellow members, that I present to you the Norman Medal.

CHARLES H. PAUL, M. AM. SOC. C. E.—Mr. President and Gentlemen: This honor is highly appreciated; it is a source of great satisfaction to me to know that a paper of mine has been classed as a real contribution to engineering science.

THE PRESIDENT.—The next in order is the award of the J. James R. Croes Medal to William Cain, M. Am. Soc. C. E., of Chapel Hill, N. C., for Paper No. 1483,† "The Circular Arch Under Normal Loads." For many years engineers have known of the beautiful mathematical work of Professor Cain; but what seems to me to be the highest tribute of excellence that a man can have is the fact that when a Student Chapter of the American Society of Civil Engineers was established at the School of Engineering of the University of North Carolina, the members insisted that it be called the William Cain Chapter in token of their appreciation of the kindliness, the courtesy, and the many fine endearing qualities of Professor Cain. Professor Cain will be presented by Professor Braune.

* *Transactions*, Am. Soc. C. E., Vol. LXXXV (1922), p. 1181.

† *Transactions*, Am. Soc. C. E., Vol. LXXXV (1922), p. 233.

GUSTAVE M. BRAUNE, M. AM. SOC. C. E.—Mr. President and Guests, Members of the American Society of Civil Engineers: Those of us who are engaged in the active prosecution of our daily labors often wonder with amazement at the diligence and perseverance of our worthy members who contribute every now and then valuable papers to our Society records. These men are rendering great service to the Engineering Profession, and we are doing honor to ourselves when we assemble here and show them recognition of their unselfish labors. Down in North Carolina, at the beautiful little village of Chapel Hill, the seat of the State University, we cherish and honor the presence of one of these unselfish engineers. For more than thirty years, he has been practicing that noblest specification of our great profession—rendering service to mankind.

Major Cain has spent most of his years as a teacher, and the great success in his chosen life work is attested by the gratitude and love of his students. Some years ago, as a youngster, when I began practicing my profession, and was laboring with the earth pressures of Coulomb and Rankine and the arch theories of abstruse writers, I would gratefully turn to those little green Van Nostrand books of Major Cain and find the light. If we look over the index of the *Transactions,* we shall see the name of William Cain occurring very frequently, and we will find that these papers are written in the same clear and lucid style. And that is one of his greatest achievements, to write simply so that the ordinary busy engineer can readily grasp his theories. As Major Cain once remarked to me, "I despise theoretical engineering data that cannot be readily applied in practice." And so we find his latest contribution to *Transactions,* "The Circular Arch Under Normal Loads", written from the standpoint of practical application and easily understood by those who are not even classed as expert mathematicians.

Therefore, Mr. President, I wish to express my deep and sincere appreciation to those who have given to me this great privilege of presenting to the Society the winner of the J. James R. Croes Medal, William Cain, of North Carolina.

THE PRESIDENT.—On behalf of your fellow members, I take great pleasure in handing you this mark of appreciation of your work and your personality.

WILLIAM CAIN, M. AM. SOC. C. E.—Mr. President and Fellow Members: I do not know how it has come about; I suppose it is a matter of surprise to all of us who receive medals. I can only infer that the Committee imagined that I had pushed the development of the theory of arch dams just a little bit farther, and I am very glad to know that it has been appreciated to that extent. I know that I appreciate the labors of the Committee on Medals and Prizes to the fullest extent, because I am familiar with their methods of painstaking investigation and grading of papers—a labor which is without reward or hope of reward; and for the unselfish work of those gentlemen I know the Society will join me in thanks to that Committee.

THE PRESIDENT.—The next of our prizes is the Thomas Fitch Rowland Prize, awarded to Gustav Lindenthal, M. Am. Soc. C. E., of New York City, for Paper No. 1496,* "The Continuous Truss Bridge over the Ohio River at

* *Transactions,* Am. Soc. C. E., Vol. LXXXV (1922), p. 910.

Sciotoville, Ohio, of the Chesapeake and Ohio Northern Railway." Mr. Lindenthal will be presented by Professor Burr.

WILLIAM H. BURR, M. AM. SOC. C. E.—Mr. President, the efficient accomplishment by civil engineers of works of unusual difficulty or magnitude is seldom accorded suitable recognition by the general public; nor are such accomplishments often rewarded by corresponding emoluments. It is well, therefore, that the American Society of Civil Engineers should from time to time confer proper marks of appreciation on those of its members who have shown distinguished excellence in works of magnitude or difficulty, for which they have been responsible.

I, therefore, present Gustav Lindenthal, for many years Member of the American Society of Civil Engineers and of the Institution of Civil Engineers of Great Britain and of many other scientific and professional organizations; widely experienced in the design and construction of engineering works in this and other countries; ingenious and fertile in his methods of procedure; resourceful in overcoming difficulties; courageous and resolute in reaching his convictions; possessing a thoroughly professional quality in all his practice, and always utilizing every advance in engineering science; as eminently qualified by his attainments in the construction of many bridges and other works of prominence to receive marked distinction at your hands; and I request that you, as President of the American Society of Civil Engineers, award to him the Thomas Fitch Rowland Prize.

GUSTAV LINDENTHAL, M. AM. SOC. C. E.—Mr. President and Gentlemen: It is a great gratification to me to receive this prize. Forty years ago, I was the first one to receive it. It was then awarded to me for a paper* on the rebuilding of the Monongahela Bridge in Pittsburgh, Pa., the first bridge in which open-hearth steel was used. I very much appreciate the honor and the compliment, and I thank you for it.

THE PRESIDENT.—The next in order is the James Laurie Prize. This is presented this year to Arthur T. Safford, M. Am. Soc. C. E., the worthy son of one of the foremost mathematicians that this country has ever known, and the successor at the present time and for many years past of our Past-President, the late James B. Francis, in the management of water power at Lowell, Mass., and to his associate, Edward P. Hamilton, Jun. Am. Soc. C. E., for Paper No. 1503,† "The American Mixed-Flow Turbine and Its Setting". It gives me great pleasure to ask Professor Hughes to present Messrs. Safford and Hamilton and to state their personal qualifications for this prize.

HECTOR J. HUGHES, M. AM. SOC. C. E.—Mr. President and Members of the American Society of Civil Engineers: I have the honor to present to you Mr. Arthur Truman Safford, and Mr. Edward Pierce Hamilton.

Mr. Safford is Engineer, Proprietors of the Locks and Canals on the Merrimac River at Lowell, Mass. He began the practice of engineering in 1887, upon graduating from Williams College. In 1894, he entered the service of the Locks and Canals as Assistant Engineer. In 1917, he became the Chief Engineer, succeeding the late Hiram F. Mills, Hon. M. Am. Soc. C. E. In

* *Transactions*, Am. Soc. C. E., Vol. XII (1883), p. 353.
† *Transactions*, Am. Soc. C. E., Vol. LXXXV (1922), p. 1237.

addition to Mr. Safford's work at the Locks and Canals, he has been a Consulting Engineer for many years to numerous corporations and municipalities, and he has taken a leading part in the solution of many difficult and important hydraulic and sanitary problems.

Mr. Safford has also contributed largely to the cause of engineering education by research, writing, lecturing, and teaching. At one time, he was the Lyman Lecturer at the Sheffield Scientific School, Yale University. For many years he was Lecturer on Hydraulic Engineering at Harvard University; and for more than a quarter of a century, he has unselfishly, and often at great personal sacrifice, given of his time and knowledge to its Engineering School. One of his notably great services to engineering education has been in making his office an admirable training school for hydraulic engineers.

Because of his great scientific attainments and rugged intellectual honesty, Mr. Safford stands very high in the esteem of his fellow engineers. He is an eminent successor to the line of eminent men who have held the office of Engineer at the Locks and Canals.

Mr. Hamilton is Assistant to Mr. Safford, and since leaving Harvard, he has been working and studying under him. He is an admirable example of what a young engineer can do for himself under the wise and kindly guidance which Mr. Safford provides for the young men in his office.

THE PRESIDENT.—It gives me great pleasure, on behalf of the Board of Direction and the Members of the Society, to bestow on you, Mr. Safford, this appreciation of your work.

ARTHUR T. SAFFORD, M. AM. SOC. C. E.—I might say that in the hundred years of practice of water power, which our Company has maintained, there have been opportunities for many hydraulic papers, and the late Mr. James B. Francis contributed a great many to the Society; but it needed a suggestion from President Freeman to bring out the paper by Mr. Hamilton and myself. We thank President Freeman for the suggestion and you for the opportunity.

THE PRESIDENT.—We shall now resume the order of the day. I call for the report of the Special Committee on Irrigation Hydraulics, Director D. C. Henny, Chairman.

D. C. HENNY, M. AM. SOC. C. E.—This report is addressed to the Board of Direction of the Society:

"PROGRESS REPORT OF
SPECIAL COMMITTEE ON IRRIGATION HYDRAULICS

"PORTLAND, OREGON, December 5, 1922.

"TO THE BOARD OF DIRECTION,
AMERICAN SOCIETY OF CIVIL ENGINEERS.

"GENTLEMEN.—At its first meeting at San Francisco in October, 1922, the Special Committee on Irrigation Hydraulics made a preliminary selection of subjects to be considered as follows: I, Evaporation losses in reservoirs; II, Conversion losses in open conduits; III, Silt problems in irrigation; IV, Water movement and pressure under dams; V, Hydraulics of chutes and drops; VI, Discharge through fully open gate structures; VII, Hydraulics of siphon spillways; VIII, Measuring irrigation deliveries; IX, Canal lining for reducing seepage.

"By correspondence the various members of the Committee suggested the following additional subjects: X, Canal slope protection; XI, Compound weirs; XII, Scouring below overflow dams; XIII, Hydraulics of side crest spillway channels; XIV, Permissible canal velocities; XV, Efficiency of high pressure outlets; XVI, Effect of rapid flow on concrete; XVII, Flow in drain tiles; XVIII, Loss of head in pipe bends; XIX, Maximum run-off in Western States.

"The Committee has in mind:

"*First.*—The final selection of subjects from the above list for immediate consideration.

"*Second.*—Through library search and standard questionnaires, the collection of existing data, and the preparation of a bibliography with synopsis and remarks.

"*Third.*—Supervision of research work relating to any of the selected subjects where co-operation with other agencies is possible.

"It is expected that at least six months will be consumed by the first and second items above listed and, that during this time the work under the third item may be commenced.

"A second Committee meeting will be called as soon as essential for further progress.

"Respectfully submitted,

"D. C. HENNY, *Chairman,*
"J. C. STEVENS, *Secretary.*"

The Special Committee has only a very small allotment of funds, probably sufficient to pay for mileage and stationery, the cost of which the Committee may incur. It is evident that research work, whether in the laboratory or in the field, but especially in the field, involves time and money which is not at the command of this Committee. Efforts are being made to obtain funds from outside sources, governmental and corporate. A great deal is also hoped through co-operation of college and university faculties in the West, and there are on this Committee representatives of every engineering college having a laboratory on the Pacific Coast, as it happens, with the exception of Stanford University, which was unintentionally omitted. Therefore, the work of the Committee will have to be done as occasion may permit.

It is hoped, however, that concrete results will gradually become available, because the members of the Committee are thoroughly enthusiastic, prepared to give much of their own time, and because facilities in the West are very good, inasmuch as in the vicinity of almost every member of the Committee there are irrigation works available for research work.

THE PRESIDENT.—Certainly this Committee has made an ambitious and energetic beginning.

(It was moved and seconded that the Progress Report of the Committee be received and placed on file.)

THE PRESIDENT.—Gentlemen, you have heard the motion; those in favor will say, "aye"; contrary minded, "no". The motion is carried.

I shall ask if the Secretary has any announcements to make at this time.

(The Secretary made several announcements relative to committee meetings, etc.)

THE SECRETARY.—I will read a letter that will be of interest to members of both this Society and of the Engineering Institute of Canada:

"176 Mansfield Street,
"Montreal, Canada, Jan. 11, 1923.

"THE PRESIDENT AND BOARD OF DIRECTION,
THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

"GENTLEMEN.—Taking advantage of the auspicious occasion whereby the American Society of Civil Engineers is celebrating its seventieth anniversary on January seventeenth, the President and Council of the Engineering Institute of Canada desire to extend to the President and Board of Direction of the American Society of Civil Engineers cordial greetings of goodwill, and sincere felicitations on the successful course pursued by your Society for the past seventy years. The officers of this Institute are proud of the standing attained by your organization and have a keen appreciation of the cordial relations existing between the two societies.

"In conveying this message to you, I am instructed to extend the best wishes of the Engineering Institute of Canada for a future of continuation of successful achievement on the same high standard that has crowned your efforts with success in the past.

"On behalf of the President and Council, I remain,

"Yours faithfully,
"FRASER S. KEITH,
"Secretary."

The Board of Direction has requested that the following resolution, adopted at its meeting of January 16, 1923, be read at this time:

"Whereas: The Board of Direction of the American Society of Civil Engineers has been greatly shocked by the indictment of several of its members and the institution of civil suits to recover millions of dollars from others for alleged war frauds, especially in view of the stigma and other immediate serious consequences under which they are placed by the wide publicity given to these charges; and

"Whereas: These and many other members of our Society responded to the call of their government and rendered invaluable service throughout the great war; and

"Whereas: The Constitution of the United States guarantees every accused citizen a speedy trial; therefore be it

"Resolved: That this Board believes that every instinct of justice demands that these charges be immediately tried in order that the guilty be punished and that the innocent may be freed of the serious accusations which have been made against them; and be it further

"Resolved: That copies of this preamble and these resolutions be sent to the President and the Attorney General of the United States and to the presiding officers of the Senate and House of Representatives."

A MEMBER.—I move that the Annual Meeting of this Society approve the resolution offered by the Board of Direction.

(Motion seconded.)

THE PRESIDENT.—Is there any discussion of the motion?

MERRITT H. SMITH, M. AM. SOC. C. E.—Mr. President, several members of the profession, to which you and I belong, have been indicted. We owe it to ourselves and to our Society to find out and determine quickly whether these men are guilty or not guilty. It is too often the case in this country that when

a man is indicted, or when men are indicted, they are regarded as guilty, and it is extremely difficult to eradicate the impression that that gives to the public.

Gentlemen, we should know promptly whether these men have been guilty of malfeasance in office, or whether in the mad rush of attempting to do in a few months what this country should have done over a long period of years, they are simply guilty perhaps of poor judgment, or possibly the victims of their subordinates.

THE PRESIDENT.—Are you ready for the question? Those in favor will say "aye"; contrary minded, "no". The motion is unanimously carried.

(The Secretary made several announcements relative to Board meetings, etc.)

THE PRESIDENT.—Mr. Gilman, the Chairman of the Local Committee of Arrangements, has several announcements to make.

(Mr. Gilman made announcements relative to arrangements for excursions, etc.)

LEWIS D. RIGHTS, M. AM. SOC. C. E.—Mr. President, I have a matter of new business to present to the meeting, if it is in order?

THE PRESIDENT.—It is in order at the present time.

MR. RIGHTS.—I desire to present the following resolution, and in order that you may know what I am talking about before I start, I will state that it refers to the Federated American Engineering Societies:

"*Whereas,* The Board of Direction has voted the issuance of a referendum ballot on the question of whether or not this Society shall affiliate with the Federated American Engineering Societies, said ballot to be mailed on February 1, next, and canvassed 50 days thereafter; and

"*Whereas,* This decision was reached by a vote in the Board of Direction of 13 in favor and 10 opposed; and

"*Whereas,* This proposal for affiliation having already been voted upon and rejected by the membership, it is now incumbent upon its sponsors to submit for the consideration of the membership such additional information as would justify a reversal of the previous decision; and

"*Whereas,* This step, if taken, would commit the Society to an annual expenditure of approximately $11 000, it is important that the membership should be enabled to balance the possible benefits to be derived from such expenditure as against those to be obtained from a like expenditure within the Society, for example, for the Local Sections whose welfare and development are of primary concern to the Society; and

"*Whereas,* Before acting upon this proposal, the membership should be informed as to the present situation and prospects of the Federated American Engineering Societies to whom this money is to be paid; now, therefore, be it

"*Resolved,* That in order to insure an intelligent and impartial consideration of this important proposal, the President and Board of Direction be, and they hereby are, instructed to transmit to the membership along with the ballots by which the vote is to be recorded the arguments both in favor of, and opposed to, the question of affiliation, these arguments to be prepared by two committees of three members each of the Board of Direction to be appointed by the President, one committee to be selected from those members who are in favor and one from those members who are opposed; and be it further

"*Resolved,* That in order to provide the time necessary for the preparation of the aforesaid statements and arguments, the date for the mailing of the ballots be fixed as February 15, 1923, instead of February 1, 1923, and that the date for their canvassing be fixed at 50 days after February 15, 1923."

Mr. President, before moving this resolution, I would like to say a word about it, if I may. As stated in the resolution, the Society voted on this proposition and against it two years ago. Unfortunately, it caused considerable controversy and some feeling; and it is altogether likely that the controversy and the argument back and forth unduly hampered the work for which the Society was organized and which its members are trying to accomplish.

The action of the Board of Direction in sending out such a ballot without any argument on either side, carries to many of the members the approval of the management as a whole, with no provision for obtaining the opinions of a large minority of the Board, that is, 10 against 13. It is fair that the membership should be thoroughly informed, so that whatever the result of the ballot may be, the members will be entirely satisfied and that this time the question may stay settled. I tell you very frankly that the last time I voted against the Federation; I have not had time to study it since, but if the Society is going to vote on it again, I would like to have some arguments, for and against, submitted to the membership with the ballot to be voted.

There have been precedents on former occasions, when the Board of Direction did just this thing. A committee for both sides presented the arguments. There is another National precedent in the United States Chamber of Commerce, which submits to its membership from time to time various referendums and always one will find with those referendums a very complete statement of the arguments both *pro* and *con,* so that the membership is in a position to vote intelligently, and when those ballots are finally canvassed the result has considerable effect on public opinion and on Congress. What is asked for is a dignified argument, so that whatever is done will be without feeling and for the good of the Society.

I move this resolution, Mr. President.

THE PRESIDENT.—Is it seconded?

PAST-PRESIDENT SWAIN.—Mr. President, I rise to second this resolution, and I do not see how any reasonable man can object to it. It seems to me that some things have got to be assumed to be settled when a vote has been taken upon them. I do not wish to be understood to-day as being either against or for the Federation. That is not the question now; but two years ago the Society took a vote on this subject and the proposition to join the Federation was defeated. Now, that ought to settle the matter unless conditions change.

One of the essential principles of democracy should be that when a vote has been taken, the thing is settled until conditions change. A minority has no moral right, and it ought not to have the power or opportunity to keep a thing stirred up by continually submitting it to a vote in the hope, as sometimes occurs in political bodies, that at some time the thing may slip through by mistake or through carelessness.

I cannot see how there can be any objection to giving the reasons why a change is thought necessary at this time. It may be that conditions have changed since the previous vote. I do not know whether they have or not, but I think we ought to be informed. We ought to have the arguments for

the proposition, and the arguments against the proposition. The arguments for the proposition should be drawn up by the members of the Board who are in favor of it; the arguments against it should be drawn up by the members of the Board who are against it. The arguments should not be drawn up by one person, because that one person will be in favor of one proposition and against the other, and he will inevitably, although perhaps unconsciously, belittle the arguments on the opposite side. I do not know any reason why we should fear, or why any Board of Direction should fear, to have the reasons on both sides given. If there are good reasons why we should join this Federation now, and the members of the Board believe it has good reasons, I think they ought to want to present these reasons, and they ought to be willing to have the reasons on the opposite side presented by those who believe in those reasons.

Remember that the proposition here is simply that the Board, if it sends out this referendum, shall send it out accompanied by a statement of the reasons on each side, prepared by those who believe in those reasons. It seems to me that any one who is not in favor of that lays himself open at least to the suspicion of wishing to have an unintelligent vote of the Society. In all the States which have a provision for the referendum, the arguments *pro* and *con* are prepared and sent out. It seems to me that any one who is not in favor of this lays himself open to the suspicion perhaps of wishing to have the matter go through, or to have the Federation go through, hoping that members of the Society will vote for it merely because the majority of the Board has voted for it.

I am a great believer in the rights of strong minorities; and I think the minority of this Board, or any other Board, or of any people, or any organization, should have the right to make themselves heard, and to present their reasons, so that people may intelligently judge of the question that is to be presented to them.

H. P. Hammond, Assoc. M. Am. Soc. C. E.—This is news to me; I never heard of it before. Can you inform the Society why the question is brought up again the second year after it was voted on—not the reasons for or against it, but the reason why it is brought up again this time?

The President.—We shall try to proceed in an orderly way. This matter has been presented in a most able manner by resolution, and it has been most ably seconded. It certainly seems a straightforward proposition. I hope we shall have no prolonged discussion by those who think differently on the two sides. I believe we have many much more important questions to take up in this meeting, and I hope that if prolonged discussion is apparently starting, some one will move the previous question, and that the main question can be put.

(Cries of "Question".)

The President.—Are you ready for the question? Those in favor will say "aye"; contrary minded "no". The "ayes" have it. The motion is carried.

(The Secretary made several announcements.)

THE PRESIDENT.—The next matter in order is the report of the Tellers. I would ask whether the Committee is ready to report.

MR. HAMMOND.—It is. The Tellers appointed to canvass the ballot for officers, report as follows:

"33 West 39th Street, New York, N. Y.
"January 17th, 1923.

"TO THE SEVENTIETH ANNUAL MEETING
AMERICAN SOCIETY OF CIVIL ENGINEERS:

"The Tellers appointed to canvass the ballots for Officers of the Society for 1923, report as follows:

"Total number of ballots received		2 626
"Deduct		
Ballots from members in arrears of dues	13	
" from non-corporate members	3	
" unsigned	29	
"Total number not entitled to vote		45
"Ballots canvassed		2 581
"For President:		
CHARLES FREDERICK LOWETH		2 564
Scattering		10
"For Vice-Presidents:		
GEORGE STEWART DAVISON		2 416
ANSON MARSTON		2 447
Scattering		22
"For Directors:		
District No. 3 — GLENN DICKINSON HOLMES		2 393
Scattering		4
District No. 5 — EZRA BAILEY WHITMAN		2 402
Scattering		6
District No. 7 — GEORGE HARRISON FENKELL		2 413
Scattering		2
District No. 8 — THEODORE LINCOLN CONDRON		2 414
Scattering		4
District No. 9 — RALPH NORMAN BEGIEN		2 407
Scattering		0
District No. 12 — GEORGE COTNER MASON		2 396
Scattering		13

"H. P. HAMMOND, *Chairman,*

"B. B. ANDERSON,
W. L. CADWALLADER,
HENRY R. CODWISE,
J. K. FINCH,
HALSEY FRENCH,
HOWARD H. GEORGE,
SHORTRIDGE HARDESTY,
HERBERT C. KEITH,
HAROLD M. LEWIS,
"GEORGE A. NOREN,
FRANCIS H. PHIPPS,
FREDERICK H. POND,
CHARLES H. SCHAEFER,
RUDOLPH SCHWEIZER, JR.,
ROBERT L. H. TATE,
FRANK T. TOWNSEND,
HENRY W. TROELSCH,
RICHARD W. TULL,
"Tellers."

THE PRESIDENT.—It is a pleasure to find such great unanimity of opinion as to the gentlemen elected to serve the Society for the ensuing year.

(The President announced the names of the successful candidates.)

THE PRESIDENT.—I will appoint Past-Presidents Davis and Webster as a committee to escort the new President to the chair, and the other officers to the platform.

(Past-Presidents Davis and Webster escort President-elect Loweth to the chair.)

CHARLES F. LOWETH, PRESIDENT, AM. SOC. C. E.—Gentlemen of the American Society of Civil Engineers; I assure you that I appreciate more than I have words to express this honor that you have conferred upon me. I trust that I may, in some degree at least, measure up to what you may rightly expect of the President of this Society.

We are celebrating to-day the Seventieth Annual Meeting of this Society. The seventy years of honorable service, coupled with the Society's record of achievement, entitles it, I think, to be considered an Institution. I think, too, that we are members of a progressive institution, and I hope that it may ever so continue. Seventy years of such a record as this Society has is a wonderful heritage. We have reason to be proud of our membership in it, and that the Society we love has accomplished so much; at the same time, I think that we should recognize that such an heritage as this carries with it great individual responsibility. The Board of Direction is a hard-working body, as I know from previous years of experience. Obviously, it cannot be 100% perfect. If the Board is to be a wise and successful leader in the work which this great Society must accomplish in order to justify its existence, it can do so, effectively, only with the fullest co-operation and assistance of the membership; therefore, for myself, for those new members of the Board, and, also, for the continuing members of the Board, I bespeak your co-operation, your counsel, your encouragement, and your advice.

Mr. Retiring President, you have to-day set such an example of promptness that it seems to me that we ought not to spoil that record. We are now a few minutes late, and I think that we had better proceed with the business of the meeting. Mr. Secretary, is there any further business?

THE SECRETARY.—Mr. President, there is not.

J. P. J. WILLIAMS, M. AM. SOC. C. E.—Is this the time for new business?

THE PRESIDENT.—It is.

MR. WILLIAMS.—I have a resolution which I would like to present to the members of the Society:

"*Whereas,* Many engineers, including members of this Society, actively supported the recent World War, which was entered by the United States with the avowed purpose of preserving civilization in 'a war to end war' and 'to make the world safe for democracy'; and

"*Whereas,* It is now evident that the World War did not end war, and that present conditions in Europe may soon lead to another war; and

"*Whereas,* The next war between civilized nations will in all probability result in the complete destruction of so-called Christian civilization; and

"Whereas, The Engineering Profession is devoted to the service of humanity in directing the great sources of power in Nature for the benefit of the human race, not for its destruction; therefore

"Be It Resolved, That the members of the American Society of Civil Engineers in Annual Meeting assembled this 17th day of January, 1923, hereby declare their opposition to human warfare and their refusal to support war for any purpose or at any time; and

"Be It Further Resolved, That the Board of Direction be requested to take such action as will aid in the establishment of an international economic commission for the purpose of regulating international commerce and directing the development of the resources of the world for the benefit of all mankind."

MR. MERRITT H. SMITH.—Mr. President, I move that the resolution be tabled.

(Motion seconded.)

THE PRESIDENT.—It is moved and seconded that the resolution just read be tabled. Those in favor, manifest it by saying "aye"; contrary, "no". The motion is carried.

MR. SEAMAN.—I move that we adjourn.

(The motion was seconded and carried and the meeting adjourned.)

TECHNICAL SESSIONS

Wednesday, January 17, 1923.—The first Technical Session, which was also a Joint Meeting with the Society for the Promotion of Engineering Education, was called to order at 2:10 P. M.; President Charles F. Loweth in the chair; John H. Dunlap, Secretary; and present, also, 173 members and guests.

The subject for discussion at this meeting was "Engineering Education". The first speaker was Charles F. Scott, President of the Society for the Promotion of Engineering Education, and Professor of Electrical Engineering at Sheffield Scientific School, Yale University, who presented a paper entitled "The New Project of the Society for the Promotion of Engineering Education".* Professor Scott was followed by William G. Raymond, M. Am. Soc. C. E., who discussed "The Outlook of the Engineering Colleges of the Middle West".†

(Nelson P. Lewis, M. Am. Soc. C. E., took the chair.)

Discussion on the papers by Professors Scott and Raymond was opened by Robert Fletcher, M. Am. Soc. C. E., and was participated in by Messrs. Frank B. Sanborn, J. K. Finch, Howard Constable, George F. Swain, and C. M. Spofford.

A paper by Magnus W. Alexander, Managing Director of the National Industrial Conference Board, entitled "The Objective in Engineering Education",‡ was read, in the absence of Mr. Alexander, by Mr. Amasa Trowbridge, following which John L. Harrington, M. Am. Soc. C. E., presented a paper on "Co-Operation of National Engineering Societies in Engineering Education".§

* See Papers and Discussions, p. 492.
† *Ibid*, p. 498.
‡ This paper will be published in *Proceedings* for April, 1923.
§ See Papers and Discussions, p. 506.

These papers were followed by discussion of the subject by Messrs. Dugald C. Jackson, Theodore T. McCrosky, Frank B. Sanborn, T. Chalkley Hatton, Robert Fletcher, J. C. Ralston, Milo S. Ketchum, W. E. Wickenden, Howard Constable, Doane Eaton, Charles F. Scott, Sydney Wilmot, H. R. Buck, and John L. Harrington.

Adjourned.

Thursday, January 18, 1923.—The meeting was called to order at 8:30 P. M.; President Charles F. Loweth in the chair; and present, also, about 600 members and guests.

President Loweth introduced the speaker of the evening, Julius H. Barnes, President of the Chamber of Commerce of the United States, who addressed the meeting on "Transportation Keyed to Production".*

At the close of the meeting, President Loweth, on behalf of the Society, thanked Mr. Barnes for his interesting address.

Friday, January 19, 1923.—The second Technical Session was called to order at 10:10 A. M.; President Charles F. Loweth in the chair; John H. Dunlap, Secretary; and present, also, 109 members and guests.

This session was devoted to a discussion of "Engineering Research" and was opened with a paper by Arthur N. Talbot, Past-President, Am. Soc. C. E., entitled "The Research Activities of the American Society of Civil Engineers".† Alfred D. Flinn, M. Am. Soc. C. E., presented a paper on "The Work of Engineering Foundation and of the Engineering Division of National Research Council,"‡ illustrating his remarks with lantern slides.

(Milo S. Ketchum, M. Am. Soc. C. E., took the chair.)

Chairman Ketchum declared the subject open for discussion which was participated in by Messrs. Clemens Herschel, William G. Atwood, H. H. Rousseau, Olin H. Landreth, W. A. Slater, Howard Constable, Alfred D. Flinn, and W. C. Cushing.

A paper by George K. Burgess, Chief of the Division of Metallurgy, U. S. Bureau of Standards, entitled "The Study of Steels for Engineering Structures",§ was presented by the author. Mr. Burgess was followed by Otto B. Blackwell, Transmission Development Engineer of the American Telephone and Telegraph Company, who presented a paper on "Radio and Research".¶ In presenting his paper, Mr. Blackwell demonstrated his points by various apparatus.

The addresses were followed by discussion of the subject by Messrs. Charles Rufus Harte, F. E. Schmitt, Henry Goldmark, and Howard Constable.

Adjourned.

Friday, January 19, 1923.—The third Technical Session was called to order at 2:10 P. M.; Past-President John R. Freeman in the chair; John H. Dunlap, Secretary; and present, also, 197 members and guests.

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* See p. 132.
† See Papers and Discussions, p. 512.
‡ *Ibid*, p. 518.
§ *Ibid*, p. 524.
¶ *Ibid*, p. 548.

The subject for discussion at this meeting, "City Planning", was opened by Nelson P. Lewis, M. Am. Soc. C. E., with a paper on "Regional Planning".*

(Edwin A. Fisher, M. Am. Soc. C. E., took the chair.)

A paper by Morris Knowles, M. Am. Soc. C. E., entitled "Zoning",† was presented by Mr. Knowles, and in the absence of the author, a paper by George H. Norton, M. Am. Soc. C. E., on "City Planning and the Engineer",‡ was read by E. M. Walker, Assoc. M. Am. Soc. C. E.

Following the papers, the general subject was discussed by Messrs. Charles W. Leavitt, Frederic A. Delano, Charles N. Lowrie, E. M. Walker, Max W. Weir, E. A. Fisher, Rudolph Hering, Harold M. Lewis, G. P. Hemstreet, John C. Trautwine, 3d, George A. Soper, and Harold A. Capran.

Adjourned.

EXCURSIONS AND ENTERTAINMENTS AT THE SEVENTIETH ANNUAL MEETING

Wednesday, January 17, 1923.—After the Business Meeting, luncheon for about 433 members was served at 1:00 P. M., in the Engineering Societies Building.

At 7:30 P. M., a Reception and Dinner Dance in honor of the President and the newly elected Honorary Members of the Society, was held at Delmonico's, at which about 400 members and guests were present.

Thursday, January 18, 1923.—Through the courtesy of the Bethlehem Steel Company, Lehigh University, Rodgers and Hagerty, Incorporated, Contractors for the Hill-to-Hill Bridge, and the Chamber of Commerce of Bethlehem, the day was devoted to an excursion to Bethlehem, Pa., where the points of interest were the Hill-to-Hill Bridge, the plant of the Bethlehem Steel Company, and Lehigh University.

The Hill-to-Hill Bridge is a reinforced concrete and structural steel viaduct that connects three widely separated districts of the city. The bridge, which is being built for the State of Pennsylvania, through its agents, the Public Service Commission of the State, has more than twenty spandrel filled arches of lengths from 56 to 148 ft., in the main portion. Over the railroad tracks, where it was impossible to use concrete arches and obtain the full lateral clearance required for the railroad, two steel truss spans 170 ft. in length have been used. There are five ramp approaches, which are, in general, of reinforced concrete column and girder type of construction.

After the Hill-to-Hill Bridge had been viewed, through the courtesy of the Bethlehem Steel Company a luncheon was served to the visitors at the Bethlehem Hotel, after which the Saucon and Lehigh Plants of the Steel Company were inspected. At the Saucon Plant, the operations at one of the Open-Hearth Furnace Departments and the Rolling Mills were witnessed.

* See Papers and Discussions, p. 554.

† This paper, as well as a paper entitled "Parks and Parkways", by Linn White, Chf. Engr., South Park Commrs., Chicago, Ill., will be published in *Proceedings* for April, 1923.

‡ See Papers and Discussions, p. 561.

The visitors then went by train to the Lehigh Plant. The entire route was placarded with signs indicative of operations for manufacturing the products to be inspected.

At Lehigh University, the visitors had an opportunity of inspecting the facilities of the John Fritz Laboratory, which is one of the outstanding materials testing and hydraulic laboratories of the United States.

An alternate inspection trip to the Sewage Treatment Plants of Bethlehem and of Allentown, Pa., arranged through the courtesy of their Engineering Departments, was participated in by a group of those specially interested.

At 8:30 P. M., in the Auditorium of Engineering Societies Building, Julius H. Barnes, President of the Chamber of Commerce of the United States, delivered an address on "Transportation Keyed to Production". About 600 members and guests were present, and following the address, an informal Smoker and social was held on the Fifth Floor.

MINUTES OF MEETINGS OF SPECIAL COMMITTEES TO REPORT ON ENGINEERING SUBJECTS

Special Committee on Specifications for Bridge Design and Construction

January 12 and 13, 1923.—The meeting of the Special Committee was held at the Headquarters of the Society. Present, H. B. Seaman (*Chairman*), J. H. Ames, J. E. Greiner, O. E. Hovey, C. W. Hudson, E. F. Kelley, M. S. Ketchum, S. B. Slack, and C. R. Harding (*Secretary*).

On motion, duly seconded, various changes were authorized to be made in the Railway Specifications.

A sub-committee consisting of Messrs. Kelley, Ames and Slack submitted a Tentative Specification for Steel Highway Bridge Superstructure. On motion, duly seconded, the specifications, with various changes, were adopted by the Committee.

TRANSPORTATION KEYED TO PRODUCTION

ADDRESS BY JULIUS H. BARNES,* ESQ.,

AT THE ANNUAL MEETING OF THE SOCIETY,

JANUARY 18, 1923.

In order that this subject may be discussed in an orderly manner and that, at the same time, it may be invested with its human aspect which gives it its deeper interest, I submit for your consideration the following:

1.—If a standard of living is to be advanced, there is required production of those articles of general use, in excess of the current consumption.

2.—That that full production must then be served by adequate distribution, or it will fail of its full human service.

3.—That in the processes of distribution, adequate transportation is the prime requisite.

By this process of deduction, we arrive at the following conclusion: That, although production may be stimulated and enlarged, it requires that transportation be keyed to its service, or there follows a direct injury to social standards, translated into human service.

An examination of the indices of production for the past twenty years indicates that production in America has furnished the basis for a constantly advancing standard of living, and, particularly in recent years, with quickened step. Without attempting to substantiate the accuracy of the figures used, but with full confidence that they may indicate correctly substantial trends, I quote from the estimates on volume production by Dr. Day, applied between 1900 and 1920:

1.—The population of the United States increased 39.7% in that twenty years.

2.—The volume production of agriculture increased 37.6% in that twenty years. This would indicate that expansion of our home food supply, with our increasing population, is adequately assured.

3.—The volume production of mining increased 128.4 per cent. As mine production is substantially devoted to the service of industrial enterprise, we may proceed from this to consideration of the question of manufactured products.

4.—The volume of manufactured products increased 95.3% in those twenty years.

Starting with this statement of relative ratios, we may fairly assume the following trends to be conclusively established: That during the twenty years the volume production of manufactured products, in excess of continued annual production of the standard of 1900, would be approximately 1 000%, and applicable against a population-increase enlargement of the absorption basis of 1900, by approximately 200 per cent. Roughly, again, this would indicate that, for current consumption and for addition to permanent capital in those

* President, Chamber of Commerce of the United States, New York City.

twenty years, there was an excess margin of 200% of the annual standard of 1900.

There have been several attempts to ascertain what proportion of our annual production manufactures is currently consumed, such as in the form of foods or clothing, and, by a process of amortization, other articles of common use which could not be properly rated as permanent additions to capital and equipment. Perhaps the fairest statement of this is the calculation of Dr. King, in which he arrives at an estimate of 25% of annual manufacture production as being permanent addition, and not currently consumable. On this assumption, and not endeavoring to make too exact a calculation, but only for the purpose of clearly demonstrated trends and tendencies, we may fairly conclude that, in 1920, there had been accumulated for common use, such permanent household and other capital as would indicate roughly three times the amount available per capita as in 1920. This general statement may be roughly checked by ordinary observation. It is within the memory of this present generation that we have witnessed the introduction into general use of such modern necessities and conveniences as bathrooms, modern plumbing, electricity in many forms, telephones, phonographs, and automobiles, besides the usual expansion of shop, office and factory equipment, and furnishings of the home. It is at once manifest that, if this is a fairly accurate conclusion, that the contribution to human comfort and human happiness with this enlargement of articles in common use is a most striking accomplishment of these twenty years, which may be rated pre-eminently an era of industrial production.

In its human aspects, this conclusion is highly re-assuring, because the very fact that a constantly expanding market for manufactured products, reaching such an enormous aggregate as in 1920, could only be reached by a great expansion in the buying power of many people. Manifestly, if wealth and buying power were concentrated in the hands of only a few, no such output on industrial production could have been marketed. It is, therefore, both the sign of equitably distributed earning and buying power, and also, of itself, the assurance of a maintenance and increase in that buying power, through the very employment which it has, itself, created. It is manifest also that during this period, distribution service in the form of transportation kept step at least to this increased production. In securing and maintaining this increased volume of production, it is again impossible accurately to estimate the expanded producing power per capita due to several factors, but I am sure you will agree with me there are, nevertheless, potent factors in this increased production per capita. I refer to the enlarged producing capacity of individuals through the service of recent inventions and the recent application of science to large-scale productive industry. Although not reducible to exact terms, I am sure you will agree with me that the following factors are potent in that production increase:

1.—The man of unusual mentality and superior directing ability, through the aid of modern devices, such as the telephone and telegraph, the automobile, and the fast train, through time and labor-saving devices of every description,

themselves resting on the security of standardized chemical and engineering standards, can extend his directing ability to a much larger area than was possible to the generation before. Such superior directing ability applied to production may operate many manufacturing plants, where his predecessor of twenty years ago would have been employed in directing a single facility.

2.—Large-scale production itself has created an area of service for the man of low mentality, in which, with simplified processes such a man now performs services formerly requiring those of a highly skilled mechanic. This man may have been of such relatively low desirability in industry in its former state that his employment was intermittent, and he may even have been a burden on public maintenance during periods of slack employment.

3.—Between these two extremes of earning ability, range the various degrees of mentality and skill, but clearly all of them made effective through modern methods and tools and equipment in producing for society a margin of production above the consumptive needs of himself and his dependents.

When one is impressed with the rapidly increasing utilization through the processes of industry of enlarging conquest over such natural forces as electricity, as typified by the recent acquisition of the radio, one may look forward with all confidence to a quickening service and an enlarging volume of the manufactured products of industry.

Moreover, the service to industry of invention and mechanical skill enlarges at a rate which promises to release, by the substitution of mechanical processes for manual, perhaps enough of manual labor from present plants to serve the necessities of expanded production in industry. Therefore, we survey with especial interest the prospective capacity of our transportation facilities adequately to care for and to meet this probably enlarging volume of production which presses for distribution.

In the record of our railroads—always the chief channel of transportation—we find assurance of a great expansion, even under difficulties:

(*A*) The ton-mileage of 1900 of 141 599 000 000, had increased in 1920 to 413 675 000 000.

(*B*) Passenger miles had increased from 16 039 000 000 to 47 366 000 000.

(*C*) Miles of track had increased from 258 784 to 405 831.

From these three statements, a general deduction is possible: That there is an increasing volume of earning traffic per mile of road, and, manifestly, this, of itself, would mean a natural economy in capital charges. On the other hand, railroads requiring labor and service must meet in their wage scales the constantly enlarging earning power indicated in the figures of per capita production, and must meet the competition for labor set by industries. There is, of course, a constant effort to offset this trend of higher labor charge by other possible economies.

The direction in which this effort has been effective, as indicated in a long-range comparison, rests in the relation of the dead load to earning load per car. Fifty years ago, and before specialized types of cars were generally developed and in use, the freight car of American railroads represented roughly 65% of dead load and 35% of earning load. In 1922, a specialized type of

car for ore and coal had 20% of dead load and 80% of earning load capacity. It is evident that the limits of further economy in improving this relation must be very small. It is to be hoped, however, that other avenues of operating economy will develop, because America with its long distances is greatly dependent on the cheapest possible transportation charge.

Again, without attempting to give detailed statistics, it is manifest that, in relation to our railroads, any material expansion of their service must require large additional capital investments. It is probable that some single-track and double-track lines are approaching the maximum load possible for the capacity of their present rails, and any substantial increase means at once new roadbeds and new rails.

Moreover, it is apparent even to casual observation that, as to terminal facilities, the maximum limit of service is even nearer final exhaustion. The late James J. Hill, F. Am. Soc. C. E., stated in 1907 that it would require the investment by American railroads of $1 100 000 000 per year, for five years, to equip the railroad terminals of this country to meet adequately the traffic which was clearly in sight for those terminal facilities.

Manifestly, no such sum has been invested in terminal improvements, even in the fifteen years which have since intervened; but the explanation of this lies largely in the supplementary service of the new form of transport—the motor truck. The relation of this form of transport to the established railroad is still in process of evolution. In some quarters, it is treated as an active competitor of railroad service, whereas by others it is looked upon as a great supplement and feeder to railroad traffic. At all events, when, against the 2 600 000 000 actual tons lifted by all the railroads of this country in 1921, we place the estimate by the Automobile Chamber of Commerce of the actual tons lifted that year by motor trucks at 1 400 000 000 tons, although for shorter distances, we gain a new appreciation of the early necessity of defining and co-ordinating these two forms of transportation service.

Manifestly, it requires a determination of the question of fair competition between a railroad, the rates of which are regulated and controlled, and using a roadbed constructed by the investment of private capital, as against a shuttle service like the motor truck, free of regulation and using a highway constructed and maintained at the public expense. Both the spirit of fair play and the requirement of self-interest dictate an early determination of these proper relations. It seems fair to suggest that the motor truck, engaged in competitive freight service, should at least make a contribution in return for the construction and maintenance of the highway on which it operates. Many far-seeing leaders in the motor industry recognize the fairness of such a principle. It will require careful analysis, aided by the best technical engineering opinion, to work out a fair approximation of such a proper charge.

On the other hand, the railroad rate structure of relative rates on various commodities has not been adequately reviewed in recent years. A rate structure which has been blanketed up and blanketed down without any attempt to approximate the varying degrees of an expanding labor charge into the relative commodities, is not one which can wholly justify itself on sober

analysis. It may be that the railroad terminals of this country are congested with an undue volume of package and less-than-car-load freight handled by the roads on an unreviewed rate scale, which, to-day, because of the large factor of labor involved in such handling, may be carried at an actual out-of-pocket expense by the interested roads or at least not at a proper contribution of adequate earnings. The harm of such a situation, if true, would extend in two directions:

1.—That, in the necessary aggregate revenue of the railroad, an undue burden would thus be laid on the rates of other commodities and other traffic.

2.—That it would be unfair competition for the motor truck—a vehicle especially adapted to the handling of this type of freight for at least short-haul distances, and especially also adapted to eliminate the short delivery expense at both ends of the rail transport—draying to and from the station.

It is to be recognized that motor transport has an especial advantage in its flexibility and in case of transfer of its surplus capacity from one route or one section to another, with the fluctuating needs of sectional industry. Moreover, it appeals to the American conception of reliance on free competition, rather than Government regulation. Furnished on fair terms, the open public highway and a large number of motor-truck operators create the conditions of free competition generally recognized in America as the greatest proper security, in all commercial processes.

We have also the slowly developing avenues of water transport, with their possibility of quick expansion of facilities, once the water channels are provided. Without attempting to calculate ton-miles, the actual tonnage lifted by the waterways of this country, on its various routes, approximates as follows: Domestic commerce, at Atlantic, Gulf, and Pacific ports, for 1919, approximately 126 000 000 tons; rivers, canals, and connecting waterways, approximately 35 000 000 tons; and Great Lakes ports, approximately 90 000 000 tons. Thus, the total apparent water tonnage moved in 1919, supplementary to the rail and motor tonnage, amounted to approximately 250 000 000 tons. It is manifest that a proper development of our water channels could greatly expand this tonnage service.

One is forced to a conclusion from a survey of these various factors in transportation that, in the future as in the past, the main reliance in this country of long distances and large tonnage movement of low-priced commodities—the main dependence, after all—must rest on the adequate development of our railroads. The service which these roads have rendered in the provision of cheap transportation which has stimulated agricultural and industrial production, is typified in a single statement: That in 1828 the charter for the formation of the Baltimore and Ohio Railroad specified that west-bound rates must not exceed 4 cents per ton-mile, and east-bound rates must not exceed a total of 6 cents per ton-mile. That, by 1913, the Baltimore and Ohio Railroad's average earnings on all commodities had reached the low point of 0.6 cents per ton-mile, or one-tenth the rate east-bound allowed in the original charter. There is a story of immense service in the development of

this country, and a story repeated over and over again by most of the great rail lines.

It is manifest, too, that there is a general acceptance of the principle of regulation of transportation by railroads. Public regulation is justified in return for the use of the right of eminent domain for roadways, and on the broader ground of public interest, because in the hands of the operators of these great transportation routes rests the power, by rate relation and rate discrimination, practically to make or unmake whole communities. It is manifest, too, however, that regulation in the past has been over-rigid and shortsighted indeed. Regulation which destroyed the current earning power of railroads, undermined with it the credit of such railroads also. Thus, by curtailment of both earning and credit, they were denied, wholly or in part, the ability to expand their facilities with the expanding tonnage of the country and in anticipation of further growth. It is increasingly clear that enlightened self-interest requires a fair and even generous interpretation of regulation of these great arteries of commerce. There is apparently a public appreciation of the necessity of a change in character of regulation in this respect.

It is manifestly also in the public interest, however, that before large investments are made in terminal or special facilities and equipment in these railroads, there should be a comprehensive survey of the future of transportation in all its various forms, and then intelligent preparation for expanding the commerce of the country which will fall on these various avenues of transportation. This should be painstaking and guided by the widest vision. Only by such intelligent consideration will it be possible to key transportation to production in America.

ANNOUNCEMENTS

The Reading Room of the Society is open from 9 A. M. to 6 P. M., and from 7 P. M. to 10 P. M., every day, except Sundays, New Year's Day, Washington's Birthday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day; during July and August, it is closed at 5 P. M.

FUTURE MEETINGS

March 7, 1923.—8:00 P. M.—A regular business meeting of the Society will be held, and a paper by Jacob Feld, Jun. Am. Soc. C. E., entitled "Lateral Earth Pressures" will be presented for discussion.

This paper has not been published in *Proceedings,* but preprints will be available for the meeting.

NEW ORLEANS MEETING

The Spring Meeting of the Society will be held at New Orleans, La., on April 18, 19, and 20, 1923. The subject for discussion at the Technical Sessions will be "The River and Harbor Problems of the Lower Mississippi." The tentative program for the meeting is as follows:

Wednesday, April 18, 1923, 10 A. M.—Addresses of Welcome followed by Technical Session.

April 18, 2 P. M.—Excursion through the French Quarter of New Orleans.

April 18, 8 P. M.—Technical Session.

Thursday, April 19, 1923, 10 A. M.—Technical Session.

April 19, 2 P. M.—Automobile excursion to engineering projects of interest around New Orleans.

April 19, 8 P. M.—Informal Dinner and Smoker.

April 20.—All-day excursion by boat around the Harbor of New Orleans, visiting the Industrial Canal, and other points of interest.

SEARCHES IN THE LIBRARY

As the Library of the American Society of Civil Engineers has been merged in the Engineering Societies Library, requests for searches, copies, translations, etc., should be addressed to the Director, Engineering Societies Library, 29 West 39th Street, New York City, who will gladly give information concerning the charges for the various kinds of service. A more comprehensive statement in regard to this matter will be found on page 26 of the Year Book for 1922.

NEW LOCAL SECTIONS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

The Constitutions of the following Local Sections have been approved by the Board of Direction since the list was prepared for the 1922 Year Book, pp. 41 *et seq.*

Dayton Section (Constitution Approved by Board, April 3, 1922).

Ivan E. Houk, President; C. H. Eiffert, Secretary-Treasurer, 644 Cambridge Avenue, Dayton, Ohio.

Lehigh Valley Section (Constitution Approved by Board, April 4, 1922).

E. H. Shipman, President; M. O. Fuller, Secretary-Treasurer, 732 Avenue H, Bethlehem, Pa.

Sacramento Section (Constitution Approved by Board, Oct. 11, 1922).

Albert Givan, President; Joseph W. Gross, Secretary, Forum Building, Sacramento, Calif.

Toledo Section (Constitution Approved by Board, Jan. 17, 1922).

M. J. Riggs, President; George N. Schoonmaker, Secretary-Treasurer, 716 Stickney Avenue, Toledo, Ohio.

Virginia Section (Constitution Approved by Board, April 4, 1922).

J. C. Carpenter, President; James F. MacTier, Secretary-Treasurer, 1312 Maple Avenue, Roanoke, Va.

NEW STUDENT CHAPTERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS*

The following Student Chapters have been authorized by the Board of Direction since the list was prepared for the 1922 Year Book, pp. 46 *et seq.*:

Clemson Agricultural and Mechanical College of South Carolina.

J. H. Baumann, President; W. J. Stribling, Secretary, Clemson Agricultural and Mechanical College of South Carolina, Clemson College, S. C.

George Washington University.

Thomas F. Stewart, Secretary, 703 Ninth Street, N. E., Washington, D. C.

Georgia School of Technology.

C. M. Kennedy, Jr., President; B. S. Lide, Secretary, Box 136, Georgia School of Technology, Atlanta, Ga.

Kansas State Agricultural College.

Dean O. Smith, Secretary, 122 South 17th Street, Manhattan, Kans.

Lehigh University.

H. S. Ertner, President; J. H. Van Ness, Secretary, 223 Summit Street, Bethlehem, Pa.

North Carolina State College of Agriculture and Engineering.

J. L. Greenlee, President; L. D. Bell, Secretary, North Carolina State College, Raleigh, N. C.

Norwich University.

J. H. Kane, President; O. B. Swift, Secretary, Norwich University, Northfield, Vt.

Stadia Club (University of Oklahoma).

Lester W. Ellis, President; Edward W. Mars, Secretary, 734 DeBarr Street, Norman, Okla.

University of Nevada.

Gilbert H. Kneiss, President; Basil W. Crowley, Secretary, University of Nevada, Reno, Nev.

University of Virginia.

E. A. Smith, President; T. B. Kiener, Secretary, Box 423, University, Va.

Worcester Polytechnic Institute.

Carl F. Meyer, President; Albert P. Hayden, Secretary, Worcester Polytechnic Institute, Worcester, Mass.

* By a recent ruling of the Board of Direction, the minimum membership of a Student Chapter has been fixed at 12 instead of 20.

ANNUAL REPORT OF THE BOARD OF DIRECTION FOR THE YEAR ENDING DECEMBER 31st, 1922

In compliance with the Constitution, the Board of Direction presents its report for the year ending December 31st, 1922.

SEVENTIETH ANNIVERSARY

During this year of the Seventieth Anniversary of the founding of the Society, a number of important new activities have been initiated, six of which will be briefly described:

Regional Meetings

For the first time three general meetings of the Society have been held outside of New York City. The Spring Meeting at Dayton, Ohio, and the Fall Meeting at San Francisco, Calif., aroused a great deal of interest both in the membership resident within convenient traveling distance, and also to a gratifying degree among the membership at large. At both meetings many students from neighboring Student Chapters were in attendance. The success of these meetings has amply justified their expense to the Society. As in the past, the Annual Convention was held outside of New York City, this year at Portsmouth, N. H., in June.

Technical Divisions

The inauguration this year of Technical Divisions promises to be a very important step in the development of the Society's activities. At the present time one such Division has been organized, the Sanitary Engineering Division, and three others are in the process of formation, namely, Irrigation Engineering, Highway Engineering, and Power.

Additional Technical Divisions may be organized for the consideration of any engineering, scientific, or professional subject upon the written request of not less than twenty members of the Society. In the future, groups of members interested in some particular phase of professional work will find in the Technical Divisions of the Society a convenient means of accomplishing their purposes, thus obviating the necessity of forming new national societies.

The New Research Committees

Under the direction of the Special Committee on Research of the Board of Direction, five new special research committees of the Society have been constituted. Four of these committees, namely, those on Impact in Highway Bridges, Stresses in Structural Steel, Flood Protection Data, and Irrigation Hydraulics, are already organized and are at work; while the Committee on Hydraulic Phenomena is now being organized. The work of the new committees, added to the accomplishments of the two old research committees, should result in a notable increase of engineering knowledge.

Allotments to Local Sections

Allotments to Local Sections have been made for the first time this year. The basis for the allotments has been one dollar per member in good standing, who has paid Section dues of not less than one dollar per year. In general, the Sections have shown much appreciation of these allotments, which have

enabled them to increase the scope of their activities. The total cost of the new plan has been approximately $2 900. A few of the Local Sections have not requested their allotments.

Visits to Local Sections

In the budget for 1922 an appropriation was made to pay the traveling expenses of the Secretary in visiting Local Sections. Under this appropriation the Acting Secretary was able to visit a number of Sections. In connection with the Fall Meeting in San Francisco, the Secretary visited fourteen Local Sections and since then, to date, two more. These visits have met uniformly with the enthusiastic approval of members of the Local Sections. Many of the pressing problems, both of the Sections and of the Society, have been discussed, and the mutual interchange of ideas has been decidedly helpful.

Public Information Service

In connection with the Fall Meeting at San Francisco and the Western trip of the Secretary, a proper occasion was found to initiate a Public Information Service at Headquarters.

The activities of this Society are of importance in the future progress of this country. The general public is interested in the outstanding achievements of engineers, and welcomes information which is accurate and authoritative in regard to engineering activities. Furthermore, such service heartens the membership of the Society, and directs its attention with increasing emphasis to its public relations.

MEMBERSHIP

The changes in membership are shown in the following table:

	Jan. 1st, 1922.			Jan. 1st, 1923.			Losses.				Additions.		Totals.		
	Resident.	Non-Resident.	Total.	Resident.	Non-Resident.	Total.	Transfer.	Resignation.	Dropped	Death.	Transfer.	Election.	Loss.	Gain.	Increase.
Honorary Members	....	5	5	2	9	11	0	0	0	0	*3	3	....	6	6
Members	821	3 645	4 466	846	3 835	4 681	3	34	21	64	†195	‖142	122	337	215
Associate Members	788	4 443	5 231	799	4 441	5 240	190	80	96	31	‡57	¶349	397	406	9
Affiliates	62	110	172	59	109	168	4	7	1	3	§1	**10	15	11	‡‡4
Juniors	88	370	458	93	386	479	59	20	32	..	.....	††182	111	132	21
Fellows	4	6	10	4	5	9	....	....	....	1	.....	.....	1	....	‡‡1
Totals	1 763	8 579	10 342	1 803	8 785	10 588	256	141	150	99	256	636	646	892	246

* 3 Members.
† 190 Associate Members, 4 Affiliates, 1 Junior.
‡ 57 Juniors.
§ 1 Junior
‖ 5 Reinstatements.
¶ 7 Reinstatements.
** 1 Reinstatement.
†† 1 Reinstatement.
‡‡ Decrease.

The net increase in membership for the year is 246.

International Aspects of Membership

Scarcely a day passes during which the correspondence of the Society does not include letters from several foreign countries. In view of the prevailing unrest and national misunderstandings, it is worth while to note that this Society has within its membership engineers from nearly every quarter of the globe, who desire to co-operate with this great scientific Society. The following table summarizes the membership outside Continental United States and Canada.

Mexico	41
Central America	30
South America	107
West India Islands	106
Europe	142
Africa	12
Asia	167
Australasia	42
Total	647

APPLICATIONS FOR MEMBERSHIP

The total number of applications received has been 1 021: 761 for admission and 260 for transfer.

DEATHS

The losses by death during the year number 99, and are as follows:

Members (64): Herbert Clarendon Alden, Charles LeRoy Annan, Decatur Axtell, Archibald Stuart Baldwin, John Anderson Bensel, Frank Edward Bissell, Channing Moore Bolton, Henry Percy Borden, Byron Harkness Bryant, Harry Dean Bush, Chester Harvey Chamberlin, Frank Hudson Clement, Walter Linsley Cowles, Ignacio Marea de Varona, Solomon LeFevre Deyo, William Abial Drake, William Cushing Edes, George Russell Field, Clement Alexander Finley Flagler, Cyrus Gildersleeve Force, Wilbur Fisk Foster, Sylvan Earle Ganser, Robert Campbell Gemmell, Herbert Thomas Grantham, George Sears Greene, Jr., Julian Griggs, Henry Stevens Haines, Herman Hall, William Jewett Haskins, Lawrence Bates Jenckes, Albert Lincoln Johnson, David Henry Lane Kneedler, Toragoro Kondo, Benjamin Brentnall Lathbury, Thomas Henry McCann, David Meriwether, Jr., William Fessenden Merrill, Robert Moore, Charles Miller Morse, Robert Morris Newman, Frank Chittenden Osborn, Cornelius Van Vorst Powers, Lingan Strother Randolph, Arthur Jones Rockwood, James George Ross, Morton Franklin Sanborn, John Richard Savage, Karl DeWitt Schwendener, Arthur Marquis Scripture, Harry Kent Seltzer, Sergei Nicolaevitch Sissoeff, Clint Sanford Slayback, Robert Brewster Stanton, Horace Edward Stevens, Louis Edward Strothman, Edward Ballinger Taylor, Anderson Harvey Tyson, William David Uhler, Luther Wagoner, Frank Sherman Washburn, Edgar True Wheeler, DeBerniere Whitaker, Joseph Wood, Charles Albert Loring Wright.

Associate Members (31): Ralph Benjamin Allen, Harold Ingersoll Bell, Anson Morse Blenus, Thomas Bines Bryson, Frank Ephraim Chesley, George

Robert Davis, Robert Max DeGarmo, Harry Henry Frost, Archie Lee Harris, Gerardus Harrisson, Herman David Hirsch, Arthur Francis Holland, Walter Lawrence Hull, Swan August Kalberg, Clifford Marshall King, Louis William Klingner, Lowell Gaynor Krigbaum, William Arthur Lafler, Clarence Ivan Lantz, Percy Mapes Lau, Emeret Claude Neudecker, Spencer Baird Newberry, Clark Olds, Philip Rapp, George William Richards, Abraham John Ruth, John Earl Shoemaker, Fred Charles Smith, Edmund Abiel Thornton, John Elliott Warner, Winslow Barnes Watson.

Affiliates (3): John Alexander Dailey, Anthony Chileon Douglass, Alan Hyde Gardner Hardwicke.

Fellows (1): Edward White Clark.

LIBRARY

The Engineering Societies Library received during 1922 a total of 3 353 volumes (1 769 by gift, 1 584 by purchase), 616 pamphlets (601 by gift, 15 by purchase), and 25 maps and plans, making a total of 155 207 now in the permanent collection.

Expenditures for books, periodicals, supplies, and salaries were approximately $30 000. In addition about 8 000 non-visitors were assisted by mail or telephone. The average daily attendance was 86.

The task of recataloging the collection still occupies the chief attention of the Library Staff. During the year 16 678 volumes were recataloged and 149 980 cards prepared and added to the catalog. The catalog now contains specific references to 50 312 subjects.

The Service Bureau made 226 searches and translated 103 articles, totaling 343 130 words. It prepared 22 087 photoprints for 2 421 persons. The receipts for this work were about $14 500.

Special attention has been given to the accumulation of unbound material in the Library and the amount has been materially reduced. More than 3 000 volumes were bound during the year.

The Carnegie Corporation and the National Electric Light Association have continued their contributions to the maintenance of the Library and the Society of Naval Architects and Marine Engineers has also become a contributor.

READING ROOM

The Reading Room of the Society was open 305 days with an average daily attendance of 16.

Additions have been made to the number of non-technical as well as technical periodicals received regularly. New books on civil engineering have been added as published. Some of these were donated by the authors who are members of the Society.

The title of the monthly list of recent engineering articles has been changed to "Current Civil Engineering Literature" and a new classification has been adopted. The number of periodicals indexed has been curtailed excluding almost all periodicals which are devoted to other branches of engineering. 2 548 articles were indexed, covering 107 pages.

EMPLOYMENT SERVICE

This Service is now maintained by the four Founder Societies, its management having been relinquished by the Federated American Engineering Societies on July 1st, 1922. A Joint Committee composed of representatives of the four Founder Societies is now considering this service.

The number of men registered and placed is indicated below:

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Number of men registered	142	138	141	122	152	152	89	100	83	121	139	98	1 477
Total men placed	131	114	170	218	263	315	209	263	250	252	226	193	2 604

The total 1 477 refers only to the number of men registered during the year, the number of names on file being from 3 000 to 4 000.

COMMITTEES

There are in existence at the present time, twelve Special Committees to report on engineering subjects, as follows:

To Codify Present Practice on the Bearing Value of Soils for Foundations (Authorized December 3d, 1912).

Stresses in Railroad Track (Authorized November 12th, 1913).

Highway Engineering (Authorized October 14th, 1919).

To Consider and Recommend for Adoption a Specification for Bridge Design and Construction (Authorized August 9th, 1920).

General Form of Contract Standard Clauses (Authorized June 6th, 1921).

Industrial Education (Authorized April 25th, 1921).

Electrification of Steam Railways (Authorized January 16th, 1922).

Impact in Highway Bridges (Authorized April 4th, 1922).

Stresses in Structural Steel (Authorized April 4th, 1922).

Flood Protection Data (Authorized April 4th, 1922).

Irrigation Hydraulics (Authorized April 4th, 1922).

Hydraulic Phenomena (Authorized April 4th, 1922) (now being organized).

PUBLICATIONS

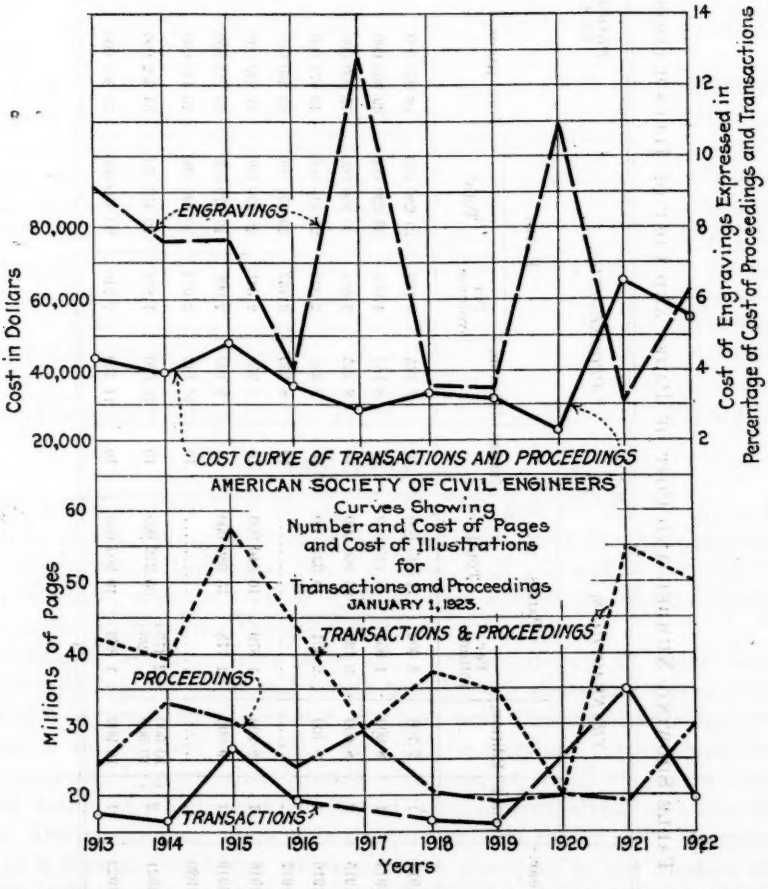
The amount of material published in *Proceedings* for the current year is almost 50% more than that in 1921. Ten numbers of *Proceedings*, a Year Book, and one volume of *Transactions* have been issued. A pamphlet entitled "Aims and Activities" has also been published, in which the work and activities of the Society is described. A change has been made in the date of issue of *Proceedings*. Heretofore, it has been published on the fourth Wednesday of the month. Beginning with the September number, the *Proceedings* of each month has been issued on the last day of the preceding month.

During the year, the stock of the various publications of the Society has been greatly reduced. Sets of *Transactions* have been given to Local Sections and to the libraries of universities and colleges and separate papers have been

disposed of otherwise. This action was necessary because of limited storage space. There are now on hand 72 743 copies of these publications, the cost of which to the Society for paper and press work alone was $14 000.80.

To expedite the reviewing of papers submitted for publication by the Society the method has been changed, in that experts are communicated with by telephone or telegraph before a manuscript is sent to them in order to insure a definite date for its return. Follow-up letters are written after ten days if a paper is not returned, and a close check is kept on all papers. The opinions of at least two experts, working independently, are obtained before a paper is presented to the Committee on Technical Activities and Publications, the name of the author being withheld from the experts.

It is thought that the membership will be interested in the table (see page 9) which shows the cost per page of text and illustrations in *Proceedings* and *Transactions* for the past ten years.



CURVES SHOWING COSTS OF PAGES AND ILLUSTRATIONS FOR *Transactions and Proceedings*, 1913–1923.

TABLE SHOWING NUMBER AND COST OF PAGES AND COST OF ILLUSTRATIONS FOR *Transactions* AND *Proceedings*.

Year.	*TRANSACTIONS.*				*PROCEEDINGS.*				*PROCEEDINGS and TRANSACTIONS*			ILLUSTRATIONS.		
	Issues.	Edition.	Pages.		Issues.	Edition.	Pages.		Total pages.	Total cost.	Cost per page.	Cost.	Percentage of total cost.	Cost per page.
			Per volume.	Total.			Per volume.	Total.						
1913	1	7 700	2 302	17 740 000	10	7 625	3 184	21 280 000	42 020 000	$43 329.77	$0.000103	$3 964.16	9.1	$0.000094
1914	1	8 200	1 968	16 140 000	10	8 150	4 076	33 220 000	39 360 000	29 083.89	0.000099	2 963.32	7.6	0.000075
1915	2	8 600	3 130	26 900 000	10	8 425	3 668	30 900 000	57 800 000	47 934.16	0.000083	3 684.68	7.7	0.000064
1916	1	8 400	2 301	19 330 000	10	8 350	2 892	24 140 000	43 470 000	35 645.65	0.000082	1 403.12	3.9	0.000032
1917	..	.....	.....	.....	10	8 550	3 482	29 350 000	29 350 000	28 608.18	0.000073	3 703.97	12.9	0.000126
1918	1	8 700	1 879	16 340 000	10	8 950	2 341	20 950 000	37 290 000	33 785.64	0.000071	1 192.20	3.5	0.000032
1919	1	9 000	1 775	15 980 000	8	9 100	2 096	19 075 000	35 055 000	32 082.69	0.000071	1 126.53	3.5	0.000032
1920	..	.....	.....	.....	10	10 142	2 014	20 440 000	20 440 000	23 446.84	0.000115	2 552.27	10.9	0.000125
1921	2	10 000 10 500	2 479 998	35 212 000	10	10 680	1 884	19 450 000	54 662 000	66 208.39	0.000121	2 034.72	3.1	0.000037
1922	1	10 900	1 826	19 900 000	10	11 100	2 740	30 400 000	50 300 000	56 200.00	0.000112	3 700.00	6.6	0.000073

Summary of Publications for 1922

	Issues.	Average edition.	Total pages.	Plates.	Cuts.
Proceedings (monthly numbers)	10	11 110	2 684	23	341
Transactions Vol. LXXXV	1	10 900	1 842	14	370
Year Book	1	11 500	381	1	...
"Aims and Activities"	1	500	33	1	3
Total	13	.....	4 940	39	714

The cost of publications, as determined by the bills actually paid during the year, has been:

For Paper, Printing, etc., *Proceedings*	$32 433.98
For Paper, Printing, etc., of 12 020 Extra Copies of Papers, Discussions, Memoirs	932.21
For Paper, Printing, etc., *Transactions* Vol. LXXXV	13 973.22
For 6 750 Extra Copies of Separate Papers for *Transactions* Vol. LXXXV	1 279.05
For Binding, Envelopes, etc., *Proceedings*	3 084.94
For Binding,* Boxes, etc., *Transactions* Vol. LXXXV	2 573.27
For Plates and Cuts	3 957.26
For Year Book	5 555.15
For "Aims and Activities"	685.42
For Copyright and Sundry Expenses	142.09
Total	$64 616.59
Deduct amount received from sale of publications	6 097.38
Net expenditure for publications for 1922	$58 519.21

MEETINGS

Thirty meetings were held during the year, as follows: At the Annual Meeting, 7; at the Spring Meeting at Dayton, Ohio, 3; at the Annual Convention, 4; at the Fall Meeting at San Francisco, Calif., 3; and 13 other meetings, all of which, with the Annual Meeting, were held at the Society Headquarters in the Engineering Societies Building.

At these meetings there were presented 7 formal papers, 5 of which were illustrated with lantern slides and 1 with both lantern slides and motion pictures; and 6 lectures and addresses 2 of which were illustrated with lantern slides and 2 with motion pictures. At 5 of the meetings, Symposiums on various subjects of engineering interest were held, at which 66 papers were presented many of which were illustrated with lantern slides and motion pictures. During the year, there were also published 11 papers and 1 Progress Report of a Special Committee which were not presented at any meeting of the Society. The number of members and others who took part in the prepara-

* Paper binding only.

tion and discussion of these papers, lectures and addresses, symposiums, and the report of the Special Committee was 291.

The total attendance at the 30 meetings of the Society was about 4 197. The registered attendance at the Annual Meeting was 953; at the Spring Meeting about 300; at the Annual Convention, 135; and at the Fall Meeting, about 325. These figures, however, do not include members who failed to register and guests.

The meetings of the Society during the year together with the papers, etc., presented thereat, were as follows:

January 4th and 5th, 1922 (Four Sessions), A Symposium on "The National Housing Problem".

January 19th, 1922, "World Activities and Their Effect on the Engineer", by Frank A. Vanderlip, formerly President of the National City Bank of New York City.

January 19th and 20th, 1922 (Five Sessions), Symposiums on "Water Transportation", "Railroad Transportation", and "Highway Transportation".

February 1st, 1922, "Past and Predicted Growth of Power Demand in New York State", by John P. Hogan, M. Am. Soc. C. E.

March 1st, 1922, "Siphon Spillways", by G. F. Stickney, M. Am. Soc. C. E.

April 5th, 1922, "The Continuous Truss Bridge Over the Ohio River, at Sciotoville, Ohio, of the Chesapeake and Ohio Northern Railway", by Gustav Lindenthal, M. Am. Soc. C. E.

April 5th, 1922 (Three Sessions), A Symposium on "Flood Problems".

April 5th, 1922, "Factors in Engineering Accomplishment, the Miami Conservancy Project", by Arthur E. Morgan, M. Am. Soc. C. E.

May 3d, 1922, "The American Mixed-Flow Turbine and Its Setting", by Arthur T. Safford, M. Am. Soc. C. E., and Edward Pierce Hamilton, Esq.*

June 7th, 1922, "Tentative Specifications for Steel Railway Bridges", Submitted as a Progress Report of the Special Committee on Specifications for Bridge Design and Construction.

June 21st, 1922 (Three Sessions), Technical Sessions.

September 6th, 1922, "Locomotive Loadings for Railway Bridges", by D. B. Steinman, M. Am. Soc. C. E.

October 4th, 1922, "Experiments with Models of the Gilboa Dam and Spillway", by R. W. Gausmann and C. M. Madden, Associate Members, Am. Soc. C. E., and "Engineering Geology of the Catskill Water Supply", by Charles P. Berkey, Esq., and James F. Sanborn, M. Am. Soc. C. E.

October 4th and 5th, 1922 (Three Sessions), A Symposium on "The Water Power Problem".

November 1st, 1922, "A Rapid Survey of Important European Ports, with an Inquiry into the Lessons to be Drawn from Them", by B. F. Cresson, Jr., M. Am. Soc. C. E.

* Now Jun. Am. Soc. C. E.

December 20th, 1922, "The Design of Structural Supports for Turbo-Generators", by Edward H. Cameron, Assoc. M. Am. Soc. C. E.

MEDALS AND PRIZES

For the year ending July, 1922, prizes were awarded as follows:

The Norman Medal to Charles H. Paul, M. Am. Soc. C. E., for his paper entitled "Core Studies in the Hydraulic-Fill Dams of the Miami Conservancy District".

The J. James R. Croes Medal to William Cain, M. Am. Soc. C. E., for his paper entitled "The Circular Arch Under Normal Loads".

The Thomas Fitch Rowland Prize to Gustav Lindenthal, M. Am. Soc. C. E., for his paper entitled "The Continuous Truss Bridge over the Ohio River at Sciotoville, Ohio, of the Chesapeake and Ohio Northern Railway".

The James Laurie Prize to Arthur T. Safford, M. Am. Soc. C. E., and Edward Pierce Hamilton, Esq.,* for their paper entitled "The American Mixed-Flow Turbine and Its Setting".

There was no award of the Arthur M. Wellington Prize or the Collingwood Prize for Juniors.

LOCAL SECTIONS

There are at the present time 39 Local Sections, five of which were organized during the year as follows:

Dayton Section
Lehigh Valley Section
Sacramento Section
Toledo Section
Virginia Section

STUDENT CHAPTERS

The Annual Reports from Student Chapters contain many matters of interest, eleven of which have been selected for special mention.

Carnegie Institute

All Civil Engineering Students are assembled once a week for a one-hour meeting.

Colorado

From one to three Student speakers are on the bi-weekly programs, in addition to the principal speaker who is usually an engineer of experience.

Cornell

Addresses by foreign students, on the opportunities for the American Civil Engineer in their countries, have proved very interesting. Preceding each meeting, cards are sent local alumni, inviting them to attend. The suggestion is made that an Annual Meeting of delegates from Student Chapters be held in connection with one of the general meetings of the Parent Society.

* Now Jun. Am. Soc. C. E.

Iowa State

Special opportunities at Homecoming are improved with the purpose of showing the loyalty of the civil engineers as a group to Iowa State College

Massachusetts Institute

The clippings indicate a wise attention to the publicity value of engineering activities.

Pennsylvania State

During the summer the officers formulated plans for the year's activities, which include two meetings a month, one social and the other technical.

Purdue

Joint meetings are sometimes held with the Student Chapters of the other Engineering Societies.

Stanford

A year book is published containing numerous articles and a directory of the alumni of the Chapter. A scholarship fund is being raised, the proceeds of which are to be used in the support of some civil engineering senior. At least one delegate is sent, with expenses paid, to each of the meetings of the San Francisco Section. At each regular meeting one student or more presents a report on some work with which he has had personal experience. Next year in addition to these reports students are to give ten-minute talks. The Chapter is at present planning the re-arrangement of the civil engineering library. At the annual smoker several members of the San Francisco Section are invited to speak. The Chapter was represented at each session of the Fall Meeting of the Parent Society in San Francisco.

Syracuse

Monthly luncheon meetings are held with programs usually consisting of illustrated lectures.

Virginia

One hundred per cent. attendance at all meetings is reported.

West Virginia

Great stress has been laid upon the delivery of student addresses from notes, rather than upon the reading of written papers.

There are at the present time 53 Student Chapters, 14 of which were organized during the year:

Carnegie Institute of Technology Student Chapter
Clemson Agricultural and Mechanical College of South Carolina Student Chapter
Georgia School of Technology Student Chapter

Lafayette College Student Chapter
Lehigh University Student Chapter
Montana State College Student Chapter
North Carolina State College of Agriculture and Engineering Student Chapter
Norwich University Student Chapter
Ohio State University Student Chapter
Stadia Club (University of Oklahoma) Student Chapter
University of Missouri Student Chapter
University of Virginia Student Chapter
Virginia Polytechnic Institute Student Chapter
Worcester Polytechnic Institute Student Chapter

FINANCES

Although the Society has suffered from unemployment among engineers, as is shown by the greatly diminished net increase in membership for the year, it is nevertheless possible to report that the finances are in a sound condition. We begin the new year with a cash balance of approximately $47 000 as against $41 000 last year; and in addition to this balance on hand, approximately $25 000 has been invested in 4¼ per cent. Liberty Loan bonds.

The reports of the Secretary and the Treasurer are appended.

By order of the Board of Direction,

JOHN H. DUNLAP, *Secretary.*

January 15th, 1923.

REPORT OF THE SECRETARY FOR THE

To the Board of Direction of the

Gentlemen:—I have the honor to present a statement of Receipts and Disbursements for the fiscal year of the Society, ending December 31st, 1922. There is also appended a general Balance Sheet showing the condition of the affairs of the Society.

Respectfully submitted,

John H. Dunlap,
Secretary.

Receipts.

Balance on hand January 1, 1922		$40 906.23
Entrance Fees	$15 995.00	
Current Dues	141 607.19	
Past Dues	9 500.81	
Advance Dues	48 434.60	
Binding	11 620.32	
Certificates of Membership	744.25	
Badges	4 928.00	
Sale of Publications	6 097.38	
Interest on Bank Deposits	1 132.85	
Interest on Investments	1 054.02	
Annual Meeting	2 920.00	
Annual Convention	686.00	
Rent from 57th St. Property	22 703.32	
Postage	214.96	
Hiram F. Mills Legacy	1 000.00	
Miscellaneous	1 749.43	
Eads Memorial Fund	3 192.14	
		273 580.27
		$314 486.50

YEAR ENDING DECEMBER 31st, 1922.

American Society of Civil Engineers.

Disbursements.

Salaries of Officers	$16 217.17	
Clerical Help	40 594.83	
Publications	64 616.59	
Postage	9 684.26	
General Printing	8 944.84	
Office Supplies	3 858.27	
Badges	2 653.14	
Certificates of Membership	462.30	
Binding Vol. LXXXV of *Transactions*	5 090.94	
Reading Room	499.84	
United Engineering Society:		
Rent for 15th and 16th Floors	8 284.21	
Library	8 000.00	
Meetings and Miscellaneous	1 865.47	
Furniture	2 994.80	
Mileage of Directors	14 882.11	
Work of Committees	4 023.51	
Am. Eng. Standards Committee	1 500.00	
Annual Meeting	6 780.46	
Annual Convention	2 118.71	
Prizes	424.22	
Interest on Mortgage	10 000.00	
Premium on Fire Insurance	358.50	
Current Business	7 971.07	
Retirement Allowance	7 500.00	
Employment Bureau	3 700.00	
Local Sections	2 886.00	
Purchase of 4¼% Liberty Loan Bonds	25 049.61	
Eads Memorial Fund	359.14	
Alteration to Vault 220 West 57th Street	4 174.82	
Miscellaneous	2 016.90	
To Petty Cash Account	1 000.00	
	$268 511.71	
Less Amount Transferred to P. C. Account	1 000.00	$267 511.71
Balance on Hand December 31st, 1922:		
In Garfield National Bank	$44 474.79	
Cash in hands of Secretary	2 500.00	46 974.79
		$314 486.50

GENERAL BALANCE SHEET

ACCOMPANYING REPORT

ASSETS

Real Estate :			
One-fourth interest in U. E. S. real estate, 25 to 33 West 39th Street, New York City		$489 785.17	
220 West 57th Street, New York City :			
Three lots (actual cost, $185 406.20), estimated value		350 000.00	
Building, with improvements, at cost	$242 029.99		
Less reserve for depreciation	54 169.81	187 860.18	$1 027 645.35
Equipment :			
Furniture and office equipment	$43 651.91		
Less reserve for depreciation	15 213.67	$28 438.24	
Library :			
Cash expended for books, etc	$22 122.22		
Donations (estimated)	72 310.83	94 433.05	122 871.29
Investments :			
$10 000 New York City non-taxable 4¼% bonds		$10 000.00	
$27 300 U. S. Liberty Loan, Fourth, 4¼% bonds, at cost		27 007.25	37 007.25
Working Assets :			
Publications on hand (inventoried cost)		$14 000.80	
Unexpired insurance premiums		305.71	14 306.51
Current Assets :			
Cash, including $2 500 in hands of Secretary		$46 974.79	
Alfred Noble Memorial (loan)		1 200.00	
Members' accounts (past due)		26 913.66	
Miscellaneous accounts receivable		1 088.76	
Interest accrued on investments		382.50	76 559.71
			$1 278 390.11

We have audited the accounts of the AMERICAN SOCIETY OF CIVIL estimate of the property valuation is correct), we certify that, in our opinion, Society at that date.

NEW YORK, January 11th, 1923.

DECEMBER 31ST, 1922.

OF THE SECRETARY.

LIABILITIES

Dues for 1923 paid in advance		$48 434.60
Interest accrued on mortgage		4 166.70
Balance of donations on account of Special Committees		1 615.25
Eads Memorial Fund (unexpended balance)		2 833.00
Mortgage payable, due January 27th, 1924		200 000.00
Funds:		
Fund invested in Society House, Lots and Library*	$31 415.78	
Herbert Steward Library Fund (Invested in New York City non-taxable 4¼ per cent. bonds)	2 000.00	
Joseph G. Swift Library Fund (Invested in New York City non-taxable 4¼ per cent. bonds)	1 000.00	
Arthur M. Wellington Prize Fund (Invested in United States Liberty Loan, Fourth, 4¼ per cent. bonds)	2 150.00	
Hiram F. Mills Legacy of $2 000—received to date from executors	1 000.00	37 565.78
Surplus (including Reserve Fund of $7 000 invested in New York City non-taxable 4¼ per cent. bonds)		983 774.78
		$1 278 390.11

* Compounding Dues Fund, $15 155; Norman Medal Fund, $1 000; Rowland Prize Fund, $1 222.50; Collingwood Prize Fund, $1 000; Fellowship Fund, $13 038.28.

ENGINEERS for the year ended December 31st, 1922, and (assuming that the the above balance sheet sets forth correctly the financial condition of the

LYBRAND ROSS BROS. & MONTGOMERY,
Accountants and Auditors.

REPORT OF THE TREASURER OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS FOR THE YEAR ENDING DECEMBER 31st, 1922.

In compliance with the provisions of the Constitution, I have the honor to present the following report:

Cash on Hand January 1st, 1922		$40 906.23
Receipts		
From current sources January 1st to December 31st, 1922	$249 876.95	
Rent from 57th St. Property	22 703.32	
Hiram F. Mills Legacy	1 000.00	$273 580.27
Expenditures		
Payment of bills by audited vouchers for current business, January 1st to December 31st, 1922	$235 401.28	
Local Sections	2 886.00	
Alterations to vault on account of widening the street at 220 West 57th Street	4 174.82	
Purchase of $25 000 4¼% Liberty Loan Bonds:		
Cost	$25 011.24	
Accrued interest	38.37	25 049.61
Balance on Hand December 31st, 1922:		
In Garfield National Bank	$44 474.79	
Cash in hands of Secretary	2 500.00	46 974.79
		$314 486.50 $314 486.50

On January 15th, 1917, a Committee of the Board of Direction recommended to the Board that as promptly as practicable high-grade bonds be purchased to protect the following funds:

Norman Medal Fund	$1 000.00
Rowland Prize Fund	1 222.50
Collingwood Prize Fund	1 000.00
Fellowship Fund	13 036.28
Making a total of	$16 260.78

The purchase of $25 000 4¼ per cent. Liberty Loan Bonds listed above amply complies with this recommendation.

Respectfully submitted,

Otis E. Hovey,
Treasurer.

MEMBERSHIP

(From January 3d to February 6tn, 1923)

ADDITIONS

MEMBERS		Date of Membership.
BOEHRINGER, ROBERT AMOS. Civ. Engr., Bureau of Water, City of Reading, 25 North 11th St., Reading, Pa.		Jan. 15, 1923
BRIGGS, EALY GRANNIS. Cons. Municipal Engr., 811 Guardian Life Bldg. (Res., 1520 Hythe St.), St. Paul, Minn.	Assoc. M. M.	Nov. 12, 1913 Jan. 19, 1923
CHANDLER, GEORGE MOSLEY. Capt., Gen. Staff, U. S. A., Army and Navy Club, Washington, D. C.		Jan. 15, 1923
CRAWFORD, WILLIAM HARRISON. Engr. and First Asst. to Gen. Supt. and Engr., Am. Pipe & Constr. Co., 112 North Broad St., Room 304, Philadelphia, Pa.	Assoc. M. M.	Feb. 4, 1914 Jan. 19, 1923
FINLAYSON, JOHN NORISON. Prof., Civ. Eng., and Head of Dept., Univ. of Manitoba, Winnipeg, Man., Canada.		Jan. 15, 1923
FREEMAN, ROGER MORSE. Constr. Engr., 8 West 40th St., New York City.		Jan. 15, 1923
GARDNER, CLAIBORNE FERRIS. Asst. Engr., Tunnel Div., Board of Estimate and Apportionment, 2700 Municipal Bldg., New York City.		Jan 15, 1923
GAUSMANN, ROY WARNER. Div. Engr., New York Board of Water Supply, Allaben, N. Y.	Assoc. M. M.	Mar. 2, 1915 Jan. 19, 1923
GRAVES, JAMES MADISON. Asst. Gen. Mgr., Duquesne Light Co., 435 Sixth Ave., Pittsburgh, Pa.		Jan. 15, 1923
GRIFFIN, WILLIAM MCKENNA. Res. Engr., Board of Estimate and Apportionment, New York City; 45 Argyle Rd., Brooklyn, N. Y.		Jan. 15, 1923
GROVER, WILLIAM ALBERT. 41 Atkinson St., Dover, N. H.	Assoc. M. M.	Sept. 12, 1916 Jan. 19, 1923
HINRICHS, ADOLF. Asst. Engr., White Constr. Co., 89 Laurel Pl., New Rochelle, N. Y.	Assoc. M. M.	June 18, 1918 Dec. 4, 1922
JEFFERS, ROBERT BUCK. Engr., Eng. and Maintenance Dept., Kodak Park Works, Eastman Kodak Co. of New York, 24 Belair St., Rochester, N. Y.		Jan. 15, 1923
KING, HENRY FREDERIC. Special Engr., Erie R. R., 71 West 23d St., New York City (Res., 2 Harvard St., Montclair, N. J.)		Jan. 15, 1923
KOREN, JESS DIDRIKSEN. Dist. Engr., N. P. Ry., Spokane, Wash.		Dec. 4, 1922
LANDERS, MARSDEN HENRY. Vice-Pres., E. Y. Sayer Eng. Corporation, 152 West 42d St., New York City (Res., 161 Hancock St., Brooklyn, N. Y.)		Jan. 15, 1923
LITTLE, FREDERICK ARTHUR. Mgr., F. W. Freeborn Eng. Corporation, 512 Slaughter Bldg., Dallas, Tex.		Dec. 4, 1922
MEANS, HOWARD CHESTER. State Highway Engr., Capitol, Salt Lake City, Utah.	Assoc. M. M.	June 30, 1910 Jan. 19, 1923
NIGHSWONGER, HARRISON WORTH. Prin. Asst. Engr., Benham Eng. Co., 512 Gumbel Bldg., Kansas City, Mo.	Assoc. M. M.	May 12, 1919 Jan. 19, 1923

MEMBERS—(*Continued*)

		Date of Membership.
PASCO, BENJAMIN GILBERT. Gen. Logging Supt., Tremont Lumber Co., Joyce, La.	Assoc. M.	Jan. 14, 1918
	M.	Jan. 19, 1923
SHIRAISHI, TASHIRO. Pres., Matsubara Coal Min. Co., 22 Igura Yochome Azabu, Tokyo, Japan.		Dec. 4, 1922
SINGSTAD, OLE. Engr. of Designs, New York and New Jersey Bridge and Tunnel Comm., Hall of Records, New York City (Res., 141 Eighty-fourth St., Brooklyn, N. Y.)	Assoc. M.	Jan. 13, 1919
	M.	Jan. 19, 1923
SMITH, ROSCOE LEE. Engr., Houston Dunn, Inc., 708 South Washington Sq., Philadelphia (Res., 210 Park St., Ridley Park), Pa.	Assoc. M.	Mar. 11, 1919
	M.	Jan. 19, 1923
STEPHENS, FRANK WILLIAM. Irrig. Supt., The Barahona Co., Inc., Barahona, Dominican Republic.	Assoc. M.	Mar. 5, 1912
	M.	Dec. 4, 1922
STONE, WILLARD WILBERFORCE. Res. Engr., Fuller & McClintock, Glen Cove, N. Y.	Assoc. M.	Feb. 7, 1906
	M.	Jan. 19, 1923
WALKER, ISAAC STANLEY. Chf. Engr. and Gen. Mgr., New Chester Water Co., 594 Drexel Bldg., Philadelphia, Pa.	Assoc. M.	Sept. 3, 1913
	M.	Jan. 19, 1923
WRIGHT, EDWIN HANSCOM. Associate Prof., Civ. Eng., Tufts Coll., Tufts College 57, Mass.		Jan. 15, 1923

ASSOCIATE MEMBERS

BALL, EDWIN LEO. Licensed Archt. and Structural Engr., 1 Haas Bldg., Alexandria, La.	Assoc. M.	Jan. 14, 1918
	Jun.	Dec. 4, 1922
BLOECHER, WALTER PHILLIP. Engr., Stone & Webster, Inc., 120 Broadway, New York City (Res., 229 Orient Way, Rutherford, N. J.)		Jan. 15, 1923
BOLTON, HARRY ROSS. Engr., Spokane Val. Land & Water Co., 730 Old National Bank Bldg., Spokane, Wash.		Dec. 4, 1922
BOUGHTON, PERCY SAMUEL. Surv. (Boughton & Lawson), 780 Summer Ave., Newark, N. J.		Dec. 4, 1922
BURR, HENRY AMSDEN. Asst. Bridge Engr., Tennessee Highway Comm., 205 Fairfax Ave., Nashville, Tenn.		Jan. 15, 1923
CAWTHON, FRANK WALTER. County Engr., Collin County, Box 69, McKinney, Tex.		Jan. 15, 1923
CHARDE, NEWELL. Engr., P. J. Walker Co., 1539 Parker St., Berkeley, Calif.		Jan. 15, 1923
DONNELLY, RICHARD VINCENT. Mgr., San. Sales, Wallace & Tiernan Co., Inc., Newark (Res., 77 North Arlington Ave., East Orange), N. J.		Oct. 2, 1922
DRISCOLL, LEON FRANCIS. Gen. Insp., Director's Office, Dept. of Public Works (Res., 102 Apsley St., Germantown), Philadelphia, Pa.	Jun.	July 6, 1920
	Assoc. M.	Dec. 4, 1922
EVANS, FRANK MORTON. 1 Birchwood Rd., Ridgewood, N. J.		Jan. 15, 1923
FELDMAN, EDMUND BURKE. Asst. Prof. of Eng., Utah Agricultural Coll., Logan, Utah.		Aug. 28, 1922
FRAHER, THOMAS. Engr., Agency Dept., The Ætna Casualty & Surety Co., Hartford, Conn.		Jan. 15, 1923
FURR, MANFORD W. Associate Prof., Civ. Eng., Kansas State Agricultural Coll., Manhattan, Kans.		Jan. 15, 1923

ASSOCIATE MEMBERS—(*Continued*)

		Date of Membership.
GENTRY, BRUCE STRIBLING. State Insp. of Mines of Texas, Rockdale, Tex		Jan. 15, 1923
GIVOTOVSKY, VICTOR TIMOTHY. Reinforced Concrete Engr., 612 West 137th St., Apartment 64, New York City	Jun.	Mar. 9, 1920
	Assoc. M.	Dec. 4, 1922
GROVES, WALTER CLYDE. Engr., M. of W. and S., Donora Southern R. R., Donora (Res., 435 North Alexander St., Monongahela City), Pa	Jun.	Oct. 7, 1914
	Assoc. M.	Jan. 15, 1923
HAYLER, GUY WILFRID. City Planning Engr., Richmond (Res., 1743 Bush St., San Francisco), Calif		Jan. 15, 1923
HUDSON, JAMES PERCY. Engr. in Chg. of Constr., Public Service Co. of Northern Illinois, 130 North Sheridan Rd., Waukegan, Ill.		Jan. 15, 1923
LAVERTY, SAMUEL PERRY. Asst. Engr., John S. Bates, 629 Rowell Bldg. (Res., 3235 Balch Ave.), Fresno, Calif.	Jun.	Nov. 27, 1917
	Assoc. M.	Dec. 4, 1922
MCKOWN, HOWARD PURCELL. Engr., J. Toner Barr, 18 Ann Arbor Ave., West View, Bellevue Branch, Pittsburgh, Pa		Jan. 15, 1923
MALONE, GEORGE WILSON. Contr. and Engr. (King & Malone), Cheny Bldg., Reno, Nev	Jun.	Sept. 10, 1918
	Assoc. M.	Jan. 15, 1923
MEALS, CASPER DULL. Chf. Engr., Wilcox Crittenden & Co., Inc., 127 Broad St., Middletown, Conn		Dec. 4, 1922
MEYER, ARNOLD MATTHEW. Engr., 257 East 133d St. (Res., 13 East 128th St.), New York City		Aug. 28, 1922
NORBERG, ALFRED. Designer, Bridge Dept., St. Louis County, 212 Court House, Duluth, Minn		Jan. 15, 1923
PANHORST, FREDERICK WILLIAM. Res. Engr., Washington State Highway Dept., Box 1031, Raymond, Wash		Jan. 15, 1923
PETERS, CHARLES ALBERT, JR. The Woodland, Apartment 301, Washington, D. C		Jan. 15, 1923
PHELPS, LAURANCE WILLIAM. Structural Draftsman, California Standard Oil Co., 410 Schraeder St., San Francisco, Calif.		Jan. 15, 1923
QUIRK, LOUIS FRANCIS. Civ. and Cons. Engr., Box 284, Middletown, Conn	Jun.	Sept. 12, 1921
	Assoc. M.	Jan. 15, 1923
REDFERN, IRA TAYLOR. Civ. Engr. and Surv., Village Hall (Res., 141 College Pl.), South Orange, N. J		Jan. 15, 1923
RICHMOND, CHARLES PRESTON. Asst. Engr., M. of W. Dept., N. Y., N. H. & H. R. R., 164 West Main St., Waterbury, Conn		Jan. 15, 1923
RYON, LEWIS BABCOCK, JR. Instr., Civ. Eng., The Rice Inst., Houston, Tex		Jan. 15, 1923
SCHOPPE, RAY LONGFELLOW. Commissioned Officer, U. S. Coast and Geodetic Survey, Care, Coast Survey, Manila, Philippine Islands		Oct. 2, 1922
TURNER, DANIEL NORMAN. Asst. Engr. of Bldgs., Bell Telephone Co. of Pennsylvania, 20 Schiller Ave., Narberth, Pa	Jun.	Nov. 28, 1916
	Assoc. M.	Jan. 15, 1923
VAN AUKEN, SANDERS. Draftsman, Union Constr. Co., 1904 Harrison St., Oakland, Calif		Dec. 4, 1922
WILLIAMSON, PAUL REVERE. Designing Engr. and Chf. Draftsman, Knickerbocker Ice Co., 41 East 42d St. (Res., 329 West 57th St.), New York City		Jan. 15, 1923

ASSOCIATE MEMBERS—(*Continued*)

	Date of Membership.
WILSON, WILLIAM HENRY. Secy. and Director, R. T. & A. D. Stewart Contr. Co., 300 North Front St., Easton, Pa.	Jan. 15, 1923
WOODWARD, JAMES BROWN SIRR. 414 Stewart Ave., Ithaca, N. Y.	Jan. 15, 1923
WRAY, HERSCHEL GEORGE. 2192 Oakdale Rd., Cleveland Heights, Ohio	Jan. 15, 1923
YOUNG, ARTHUR APPLETON. Draftsman, City Engr.'s Office, W. 1603 Indiana Ave., Spokane, Wash.	Dec. 4, 1922

JUNIORS

BARRON, ERIC STUART. 1162 Pacific St., Brooklyn, N. Y.	Jan. 15, 1923
COLLINS, ROBERT WETMORE. Mgr. Texas Office, Doullut & Williams Co., Inc., 1103 Carter Bldg., Houston, Tex.	Aug. 28, 1922
CORNELL, HENRY. 626 East 17th St., Santa Ana, Calif.	Jan. 15, 1923
EDMONSTON, JOSEPH RICKETTS. Asst. Engr., United Hudson Elec. Corporation, 50 Market St., Poughkeepsie, N. Y.	Oct. 2, 1922
GASTON, LINDON STEVENS. Research Asst., Purdue University, Eng. Experiment Station, 315 University St., West Lafayette, Ind.	Jan. 15, 1923
GOLD, MAXWELL. 209 East 10th St., New York City	Jan. 15, 1923
KAHLER, GEORGE EVERETT. 541 West 113th St., New York City	Jan. 15, 1923
KNAPIK, EDWARD MATHIAS. Asst. to W. L. Huber, 1304 First National Bank Bldg., San Francisco (Res., 1423 West St., Oakland), Calif.	Jan. 15, 1923
MCKENZIE, CHARLES FRANKLIN. Secy.-Treas., R. M. Walker Co., Inc., 713 Grant Bldg., Atlanta, Ga.	Dec. 4, 1922
MEWES, FREDERIC THEODORE. Draftsman, Kelker, De Leuw & Co., 1206 Conway Bldg., Chicago, Ill.	Jan. 15, 1923
NYMAN, LEO. Care, B. J. Beck, 548 West 124th St., New York City.	Jan. 15, 1923
O'HARA, RAYMOND ANTHONY. Civ. Engr. with Nelson P. Lewis, 130 East 22d St. (Res., 2482 Valentine Ave.), New York City	Aug. 28, 1922
SAMMARCO, SERGIO FRANCIS. Topographical Draftsman, Grade C, Dept. of Taxes and Assessments, 900 Municipal Bldg., New York City.	Jan. 15, 1923
SCHAEFER, GEORGE ALLEN. Chf. of Survey Party, City of Middletown, 54 Lawn Ave., Middletown, Conn.	Jan. 15, 1923
SCHNEIDER, ARTHUR PETER. Cost Engr., Valuation Dept., M., K. & T. Ry., Box 64, Parsons, Kans.	Jan. 15, 1923
SCHWARTZ, JACOB DAVID. 268 South 2d St., Brooklyn, N. Y.	Jan. 15, 1923
STRAUS, EDGAR ANDREW. 4673 Park Ave., New York City	Jan. 15, 1923
STRAUSS, SYDNEY MARTIN. 401 West End Ave., New York City	Jan. 15, 1923
UHR, SAUL IRVING. Engr., Kober Constr. Co., Middle City Bldg. (Res., 4032 Girard Ave.), Philadelphia, Pa.	Dec. 4, 1922
VINCENT, GUY MORGAN. Computer Engr., M., K. & T. Ry., 109 South 27th St., Parsons, Kans.	Jan. 15, 1923
VOSS, HELMUTH CARLYLE. Asst. Engr., Great Southern Lumber Co. and Bogalusa Paper Co., Bogalusa, La.	Dec. 4, 1922
WILCOX, GILBERT LAWRENCE. Junior Engr., Day & Zimmermann, 611 Chestnut St. (Res., 917 Farragut Terrace), Philadelphia, Pa.	Jan. 15, 1923
WILSEY, EDWARD FRANKLIN. 15 East Harrison St., Iowa City, Iowa.	Jan. 15, 1923

RESIGNATIONS

MEMBERS	Date of Resignation.
RICE, ELTON	Jan. 5, 1923
KENT, HERBERT VAUGHAN	Jan. 5, 1923

ASSOCIATE MEMBERS

BRIDGES, EARLE FISHER	Jan. 5, 1923
CANTWELL, HERBERT HERLUIN	Jan. 5, 1923
GRIGSBY, WALTER BERTON	Jan. 5, 1923
LANGLEY, CLARENCE ERWIN	Jan. 5, 1923
SAWDON, WALLACE ATTERBURY	Jan. 5, 1923
SMITH, FRANCIS MARSHALL	Jan. 5, 1923
TRASK, WARREN DUDLEY	Jan. 5, 1923
TRUE, HENRY ALFONSO, JR	Jan. 5, 1923

JUNIORS

GOLDSTINE, EDGAR NATHAN	Jan. 5, 1923

DEATHS

CARTER, SHIRLEY. Elected Junior, May 31, 1892; Associate Member, October 5, 1898; Member, December 4, 1906; died January 5, 1923.

CRESSON, BENJAMIN FRANKLIN, JR. Elected Associate Member, April 2, 1902; Member, January 7, 1908; died January 26, 1923.

GIDDINGS, FREDERICK. Elected Member, June 6, 1906; died December 13, 1922.

HEALEY, CHARLES FRANK. Elected Associate Member, June 30, 1910; Member, October 9, 1917; died December 27, 1922.

HODGDON, FRANK WELLINGTON. Elected Member, December 3, 1884; died January 26, 1923.

KNAPP, LOUIS HENRY. Elected Member, March 4, 1874; died January 16, 1923.

SMITH, HILMAR FREDERICK. Elected Associate Member, November 25, 1919; died January 6, 1923.

WHITNEY, PARKER RICHARDS. Elected Affiliate, January 15, 1917; died March 5, 1922.

ZAHNISER, GEORGE BROWN. Elected Member, November 28, 1916; died November 24, 1922.

Total Membership of the Society, February 6th, 1923

Members	**4 701**	
Associate Members	**5 256**	
Corporate Members		**9 957**
Honorary Members		**11**
Juniors		**490**
Affiliates		**167**
Fellows		**9**
Total		**10 634**

ENGINEERING SOCIETIES EMPLOYMENT SERVICE

An Engineering Societies Service Bureau was established December, 1918, as an activity of Engineering Council. It was managed by a board made up of the Secretaries of the four Founder Societies, and funds for its maintenance were provided by these Societies. On January 1, 1921, this Bureau was taken over by The Federated American Engineering Societies and was known as the Employment Service of that organization. Recently, the management of the Service has been taken over by the Founder Societies. A weekly Employment Bulletin, listing the positions available, may be seen at the office of any Secretary of a Local Section. Members of the American Society of Civil Engineers who desire to register should apply for further information, registration forms, etc., to Walter V. Brown, Manager, Engineering Societies Building, 29 West 39th Street, New York City. In order to be included in the list published in *Proceedings,* copy must be received on or before the first of each month. All communications should be addressed to Mr. Brown, giving number of position, name, address, and membership in Engineering Society.

EMPLOYMENT BULLETIN

POSITIONS AVAILABLE

DRAFTSMAN, experienced in light structural work. Sheet metal and piping. Application by letter, giving full information as to experience and salary desired. Location, Pa. R–34.

STRUCTURAL AND MECHANICAL ENGINEERS. Application by letter. Salary not stated. Location, West. R–37.

FIRST-CLASS ENGINEERING DRAFTSMAN, preferably technical graduate who has had 4 or 5 years' experience on design of structural work and elevating and conveying equipment. Should also have good general knowledge of heavy mill equipment, such as crushers, hydraulic presses, tumbling, grinding, and pulverizing equipment, etc. Application by letter stating age, technical training, experience, salary expected, and when available. Location, New York State. R–46.

DRAFTSMAN to do tracing and lettering. Must submit the following information: Brief statement of experience, sample of work, salary expected, when available for work. Prefer graduate civil engineer. Salary not stated. Location, New York State. R–54.

ENGINEER who can make suitable drawings, or rather a sketch, of a building to be erected, also give estimate on same, and be capable, in case contract is received, to run the work. Application by letter. Salary not stated. Location, New York State. R–56.

EXPERIENCED DRAFTSMAN on railroad, freight, and passenger truck work. Application by letter. Salary not stated. Location, Ohio. R–70.

DESIGNERS AND DETAILERS on structural steel. Application in person. Salary not stated. Location not stated. R–75.

YOUNG CIVIL ENGINEER to take charge of track and overhead men under direction of chief engineer. Permanent with advancement. Application by letter. Location, New Jersey. R–95.

INSTRUCTOR in architectural drafting. Capable of handling elementary mathematical work and history of architecture. Application in person. Experienced men only will be considered. Location, New York. R–96.

INSPECTOR on masonry tunnel construction under high compressed air. Application by letter. Salary not stated. Location, New Jersey. R–123.

MEN (2), to act as its representatives in Greater New York on a commission basis to sell sash chain to building contractors and architects. Would like to secure men who have established connections. Application by letter. Headquarters, Connecticut. R–124.

REINFORCED CONCRETE AND STRUCTURAL STEEL DESIGNERS. Bridge experience desirable. Application in person. Salary not stated. Location, New York City. R–126.

DRAFTSMAN capable of detailing steel reinforcing. Application by letter. Location, Pennsylvania. R–127.

YOUNG TECHNICAL GRADUATE, preferably Civil Engineering or Architectural Course, who has had some experience in

drafting. Must be neat draftsman and do good lettering. Prefer man who is in Norfolk, Va., or near-by, knowledge of the city being a valuable asset in work. Work would not be entirely drafting. Man who will be able to interview men, make summarized reports of interviews, articles read, etc., whose personality is pleasing, and who would grow into the work so he might be retained by corporation after contract is completed. Application by letter. Salary $30. Location, Virginia. R–136.

ENGINEERS with building experience, possessed of good personality, sales ability to handle educational work on concrete and cement housing. Application by letter. Salary not stated. Location, New Jersey, New York City, and New York State. R–142.

STRUCTURAL STEEL AND REINFORCED CONCRETE DESIGNER with power-plant experience for smelting plant. Application by letter. Salary not stated. Location, New Jersey. R–144.

STRUCTURAL STEEL DRAFTSMAN for mechanical department, for smelting plant. Application by letter. Salary not stated. Location, New Jersey. R–147.

YOUNG ENGINEER who should be either civil engineer or mining engineer able to do surveying, general drafting, and layout work and practically to take charge of minor construction. Salary not stated. Location, New York State. R–165.

STRUCTURAL ENGINEER experienced in designing large structures, power-houses, coal handling and conveying machinery. Technically trained men with at least 10 years' experience. Application by letter. Salary not stated. Location, Pa. R–172.

ARCHITECTURAL ENGINEER, able to design. Technically trained men with at least 10 years' experience. Application by letter. Salary not stated. Location, Pa. R–174.

RECENT CIVIL ENGINEERING GRADUATES with 1 or 2 years' experience on surveying, drafting, or construction. Must be single and Americans. Application in person. Location, Traveling. R–187.

FIRST-CLASS STRUCTURAL DRAFTSMAN. Need not be a college graduate but must have a bent for good class lettering of the *Engineering News* type, and should have had some experience on making steel and reinforced concrete drawings. Application in person. Bring sample of work in this line. Location, New York City. R–193.

SALES ENGINEERS, college graduates, 25 to 33 years of age, with experience in building construction, heat insulation, oil refining or highway work, desired by long established manufacturer for sales promotion. Application by letter, giving details of experience, names of former employers, name of Alma Mater, approximate salary desired, height and weight, character references. Also send photograph. Several excellent opportunities for right man. Application by letter. Salary not stated. Headquarters, Ohio. R–194.

CHIEF OF PARTY, single man, about 30 years old, preferably with knowledge of French and must have plane-table experience. Application by letter. Location, Haiti. R–195.

ASSISTANT CHIEF OF PARTY, single man about 30 years old, with broad instrument experience and preferably a knowledge of French. Application by letter. Location, Haiti. R–196.

REINFORCED CONCRETE DESIGNER. Must have had at least 5 or more years' experience. Application in person. Location, New York City. R–198.

ELECTRICAL ENGINEER for sales work, to sell course for civil service school. Leads furnished. Evening work. Application by letter. Commission basis. Headquarters, New York City. R–199.

DRAFTSMAN AND MAP LETTERER. High-class letterer and draftsman required. Application in person. Only good letterers considered. Location, New York City. R–210.

SUPERVISING ENGINEER on building construction. Graduate engineer preferred at least 30 years' of age with ten years' experience, five of which should have been in responsible charge of work. Applicant should be thoroughly familiar with all types of building construction, including mechanical and electrical equipment. Application by letter. Location, Illinois. R–215.

ENGINEER to act as Instructor in Civil Engineering subjects. Temporary 6 months' appointment. If satisfactory, will receive permanent appointment. Must consider this as permanent proposition and not a fill-in. Application in person. Location, New York City. R–219.

STRUCTURAL STEEL AND REINFORCED CONCRETE DRAFTSMAN. Should have had bridge experience. Salary not stated. Application in person. Location, New York. R–222.

YOUNG MECHANICAL ENGINEER with 3 or 4 years' experience in construction of general factory buildings and installation of machinery and transmission equipments. Applicant must also be neat draftsman and should submit sample of his work with application. Application. by letter. Salary not stated. Location, Pa. R–224.

SENIOR ARCHITECTURAL DRAFTSMAN with from 10 to 15 years' experience. Must be technically trained architect, Protestant, and capable of taking sketches with general specifications furnished by others, and working up complete plans and detail drawings. Will not be expected to do any structural or mechanical work. Work is Public Buildings. Application by letter. Salary not stated. Location, Southwest. R–277.

SUPERINTENDENT for supervising the erection and completion of concrete pile contracts. Concrete experience essential. Application by letter. Salary $200 to $300. Location, not stated. R–324.

YOUNG CIVIL ENGINEER with some experience with contractor on concrete work. Must be of good personality to assist on sales promotion campaign on cement. Americans and Christians only. Application in person. Location, New York City. R–327.

STRUCTURAL ENGINEERS (2 or 3) with experience in structural and reinforced concrete construction. Have a large number of factory and mill buildings of various

types and desire engineers who can both design and draw. Engineers having a general familiarity with plant equipment preferred, but there is no work of this character to do. In all work, the plant equipment is laid out by the owners. Must have had several years' experience with structural steel or reinforced concrete contractors, and also experience with consulting engineers and architects. Application by letter. Salary $300 per month, according to experience. Location, Michigan. R–328.

DESIGNER for general building construction. Must be familiar with structural steel, reinforced concrete and foundation work. Some drafting required. Application in person by appointment. Location, New York City. R–334.

MEN AVAILABLE

CIVIL ENGINEER, Assoc. M. Am. Soc. C. E. Twelve years' municipal experience, covering water supply, sewerage, pavements, city planning, etc.; last three years general civil engineering practice covering building construction, foundations, etc., both field and design. Available at once. Location immaterial. CE–398.

M. AM. Soc. C. E.; age 49; married. Wants position teaching civil engineering subjects or allied branches. Nine years' experience in this line of work; eight years active practice in civil engineering, in responsible charge of design and construction. Now employed; available at one month's notice. Salary, $300 per month. CE–399.

GENERAL SUPERINTENDENT; Graduate C. E.; 38; available soon. Desires opening in construction, preferably on dam and power-plant work. Record of accomplishment. New York interview. CE–400.

CONSTRUCTION ENGINEER, Assoc. M. Am. Soc. C. E.; age 37; married. Eighteen years' experience in general engineering and construction work, covering railroad maintenance and construction, harbor improvements, dock, power plant, and building construction. Now employed with large company. Desires change. Permanent position. Will consider industry or contractor. Vicinity of Great Lakes preferred. CE–401.

ENGINEER, Assoc. M. Am. Soc. C. E.; M. I. T. graduate; age 36. At present, Division Engineer on design and construction of extension to municipal water-works for city of 160 000. Fifteen years' broad experience on the design and construction of hydraulic structures, including large dams, pipe lines, and slow sand filters. Desires engagement with consulting engineer specializing in river and harbor or water-works, in position which will eventually develop into junior partnership, or with corporation where experience will be of value. CE–402.

PROFESSOR, M. Am. Soc. C. E.; graduate of college of liberal arts and in civil engineering, with sixteen years' engineering experience along highway, railway, and structural lines, effective speaker and writer, would consider position teaching engineering or other work of educational character. CE–403.

CONSTRUCTION ENGINEER; civil; Assoc. M. Am. Soc. C. E.; technically trained. Fifteen years' experience of a varied, a responsible and executory nature, as directing engineer or as superintendent of construction on, power house; pumping stations; water-works; ore docks; open-hearth and blast furnace mill buildings; warehouses; craneways; grade-elimination; yard and terminal improvements; wet excavations; heavy foundation work and difficult sub-structure work, under variable classes of traffic; has handled organizations of 1 200 men, together with directing the elaborate plant. At present engaged as Chief Executive on Public Work about completed. Open to consider only first-rate responsibilities with a reputable consulting engineer or big general contractors, for service in United States or abroad. CE–404.

CIVIL ENGINEER, Assoc. M. Am. Soc. C. E.; age 45; University graduate. Twenty years' practical experience on railway location, construction, and maintenance, including design of yards and shop construction. Experience on short-line railroads for six years. Can furnish references. Available at once. CE–405.

CONSTRUCTION ENGINEER, Assoc. M. Am. Soc. C. E., age 31 years; married; desires position as Superintendent or Field Engineer on construction of chemical or by-product coke plants. Has had eight years' experience on this class of work. Location in Central States preferred. Permanent connection with good future desired, rather than temporary position. CE–406.

STRUCTURAL ENGINEER, Assoc. M. Am. Soc. C. E.; Graduate C. E.; age 38; married. Twenty years' practical experience on designs, estimates, specifications, reports, supervision, and construction; all classes of commercial buildings, power plants, and appurtenant structures; new plant developments from original projection to completed construction; waterfront structures, retaining walls, heavy and eccentric foundations. Specialization; Reinforced concrete. Major experience in New York. At present employed by large industrial concern in Middle West on extensive plant development and power plant extension now nearing completion. Desires position requiring supervisory or executive ability. Capable project engineer. In fine health; no physical defects; energetic personality. A–1 references. Correspondence solicited. CE–407.

GRADUATE CIVIL ENGINEER AND CONSTRUCTION SUPERINTENDENT, Assoc M. Am. Soc. C. E.; age 34; degree 1908. Twelve years' experience, roads, bridges, surveys, sewers, water-works, and concrete industrial buildings. Experience includes design, inspection, and superintendence. Two years in charge of War Work for Construction Division, U. S. A. Available at once. Location immaterial. CE–408.

ENGINEER with highway, railroad, irrigation, and bridge construction experience. Will consider professorship or assistant professorship. CE–409.

CIVIL ENGINEER, M. Am. Soc. C. E.; age, 48; University education. Twenty-seven years' experience in exploration and preliminary surveys, design, and construction, supervising contracts and day labor, hydraulic water supply, sewers, excavation, and heavy construction. Of recent years, specialist in municipal engineering, especially roads and pavements for cities, corporations, and foreign governments. Two years with A. E. F., directing highway work. Seven years in Central and South America. References. Speaks Spanish and French. Immediately available. CE–410.

CIVIL ENGINEER, Assoc. M. Am. Soc. C. E.; age 37; Registered Engineer, New York State. Fifteen years' experience on design, construction, and maintenance of buildings, power houses, and bridges (steel and reinforced concrete). Desires position as Bridge Engineer with Railroad, Construction Engineer with Public Utility Company, or as Salesman of building materials. CE–411.

VALUABLE MAN AVAILABLE, as president, general manager, works manager, consulting or supervising engineer. Excellent training for position with large general consulting engineering, bond, banking, trust, or other financial corporation on investigation and re-organization work. Superior education and experience in public utility, mining, smelting, railroad, foundry, machine, metal-piece part manufacture, and other industries. Expert at organization, financing, administration, and economical operation and production. CE–412.

CIVIL ENGINEER, M. Am. Soc. C. E.; graduate civil engineer; married. Twenty years' varied engineering experience; extensive surveys; heavy railroad construction in earthwork and bridges; office engineer in charge of extensive valuation for large utility property; also, extensive street and interurban railway experience. At present, Engineer Maintenance of Way with large utility, in charge of all maintenance and construction. Desires to change present connection. Will consider position with railway, industry, or contractor. Personal interview solicited. Salary and references in conference. CE–413.

GENERAL SUPERINTENDENT building construction; Assoc. M. Am. Soc. C. E.; graduate civil engineer. Eight years' experience chiefly in hotel and apartment house construction. Location desired. Pennsylvania or New Jersey. CE–414.

NEW BOOKS*

(From January 1 to January 31, 1923)

The statements made in these notices are taken from the books themselves, and this Society is not responsible for them.

DONATIONS TO ENGINEERING SOCIETIES LIBRARY

THE DYNAMO, ITS THEORY, DESIGN AND MANUFACTURE: Vol. 1.

By C. C. Hawkins. Sixth Edition. London & N. Y., Isaac Pitman & Sons, 1922. 615 pp., illus., diagrams, 9 x 6 in., cloth. $6.00.

This book is a standard British text of comprehensive character, covering both direct and alternating-current generators. In this revision greater space is given to the treatment of the electromotive force of the dynamo by vectorial methods, the theory of armature winding has been reconsidered and expanded, and greater prominence is given to drum armatures. A section on the oscillation of a mechanical system, a discussion of the compressive stress on the mica plates in high-speed commutators, and the winding of shunt coils with two sizes of wire, are among the new matters that have been added. The book has been largely rewritten and carefully revised.

BIBLIOGRAPHICAL HISTORY OF ELECTRICITY AND MAGNETISM.

By Paul Fleury Mottelay. Lond., Charles Griffin & Co., Phila., J. B. Lippincott Co., 1922. 673 pp., pl., portrait, 10 x 6 in., cloth. (Gift of J. B. Lippincott Co.)

This work is the definitive edition of the author's "Chronological History of Magnetism, Electricity and the Telegraph", which had tentative publication (1891–1892) in the *Electrical World* and other journals. Since that publication, it has undergone a thorough revision and a large number of new references have been added. The volume contains a series of references, arranged chronologically, to writings on electrical science. A period of 4458 years is covered, from 2637 B. C., the earliest date when history notes anything resembling the application of the magnetic influence, to 1821, when Faraday discovered electromagnetism. Each entry gives a concise account of the work of an investigator and a list of the authorities consulted by the author. The volume is a remarkable example of erudition and industry, which will be welcomed as a guide to the records of the earlier workers and writers.

ELECTRICAL ENGINEERING LABORATORY EXPERIMENTS.

By C. W. Ricker and Carlton E. Tucker. N. Y. & Lond., McGraw-Hill Book Co., 1922. 310 pp., diagrams, 9 x 6 in., cloth. $2.25.

To make laboratory teaching effective, the student should be carefully supervised at the beginning of his course, in order that he may learn as rapidly as possible the fundamentals of electrical testing and use them as tools for his more advanced work. He should then be assigned work that will require original thinking and be required to rely more or less on his own resources. In preparing this book, the writers have kept these thoughts in mind. The text is intended to be flexible enough for adaptation to almost any course. It has grown out of extended experience in the Massachusetts Institute of Technology.

EXPERIMENTAL ELECTRICAL ENGINEERING AND MANUAL FOR ELECTRICAL TESTING:

Vol. 1. By Vladimir Karapetoff. Third Edition. N. Y., John Wiley & Sons; Lond., Chapman & Hall, 1922. 795 pp., illus., diagrams, 9 x 6 in., cloth. $6.00.

This textbook on the testing of electrical machinery is based on the course of instruction given by the author at Cornell University, but the selection of material has been modified by comparison with the courses in other colleges, so that the book presents a composite picture of what is actually taught in the electrical laboratories in this country. This edition has been completely revised and reset. Vol. 1 contains all the elementary experiments and is sufficient for the needs of general students. Vol. 2 contains advanced work needed by students of electrical engineering.

SEAGOING AND OTHER CONCRETE SHIPS.

By N. K. Fougner. (Oxford Technical Publications.) Lond., Henry Frowde and Hodder & Stoughton, 1922. 216 pp., illus., diagrams, 10 x 6 in., cloth. $7.00. (Gift of Oxford University Press, American Branch.)

* Unless otherwise stated, these books have been donated by the publishers.

The aim of the author is to present a true record of the principal sea-going concrete ships actually built up to the present, and to analyze the merits of these ships in comparison with ships built of wood and steel. The main part of this book is based on personal experience gained in the construction of about thirty vessels of concrete during the past five years. Information about ships built by others has been obtained partly through correspondence with the designers, builders, or owners, and partly from the engineering press.

MACHINERY FOUNDATIONS AND ERECTION.

By Terrell Croft. N. Y. & Lond., McGraw-Hill Book Co., 1923. 691 pp., illus., diagrams, 8 x 6 in., cloth. $5.00.

Section 1 of this book considers the general requirements that foundations for machinery must meet. This statement of fundamentals is immediately followed by divisions treating of the design and properties of the different components of foundations, such as anchor-bolts, anchor-plates, and anchors. Following these, come instructions on the installation and reconstruction of foundations. The divisions in the next group give specific information on the design and construction of foundations for certain types of machinery, including steam engines and turbines, boilers, water-wheels, electrical machinery, hammers, and planers. The concluding divisions explain methods for erecting machinery. The book is written for practical men, and avoids the use of higher mathematics. Little has been written previously on the subject.

TREATISE ON WEIGHING MACHINES.

By George A. Owen. Lond., Charles Griffin & Co., 1922. 202 pp., illus., diagrams, charts, 9 x 6 in., cloth. $3.00. (Gift of J. B. Lippincott Co.)

This book, the first English treatise on its subject, explains in simple language the principles underlying the construction of weighing machines. It is intended as a guide to the proper types for various purposes and to methods of maintaining accuracy. The basic principles of all weighing machines are included in one or another of the types described.

JIGS AND FIXTURES.

By Fred H. Colvin and Lucian L. Haas. Second Edition. N. Y. & Lond., McGraw-Hill Book Co., 1922. 237 pp., illus., diagrams, tab. 9 x 6 in., cloth. $2.50.

The authors endeavor to present herein the fundamental principles of design, arranged as nearly in the order of their application as possible, so that the tool designer can select such parts and methods as seem best suited to any problem. The new edition has been enlarged to include a greater variety of work and also to show a few boring bars and reamers.

INTERNAL-COMBUSTION ENGINES.

By J. Okill. (Pitman's Common Commodities and Industries.) Lond. & N. Y., Isaac Pitman & Sons, [1922]. 126 pp., illus., 7 x 5 in., cloth. $1.00.

This work contains a review of the development and construction of the various types of internal combustion engines, written to show how gas and oil engines stand as competitors to steam for all power purposes, and to discuss some of the power requirements that are beyond the scope of the steam engine.

ELEMENTARY INTERNAL COMBUSTION ENGINES.

By J. W. Kershaw. Second Edition; Lond. & N. Y., Longmans, Green & Co., 1922. 211 pp., diagrams, 7 x 5 in., cloth. $1.75.

This work contains an elementary account of the construction and working of oil and gas engines and power-gas producers, and is intended as an introduction to more advanced books.

AMERICAN MACHINIST GEAR BOOK.

By Charles H. Logue; Revised by Reginald Trautschold. Third Edition. N. Y. & Lond., McGraw-Hill Book Co., 1922. 353 pp., illus., diagrams, tab., 9 x 6 in., cloth. $3.00.

This book is intended to give practical data for cutting, moulding, rolling, and designing commercial types of gears, and to present this information by simple rules, diagrams, and tables arranged for ready reference. This edition has been carefully revised and enlarged, matter of little practical value having been omitted. The chief additions relate to spiral type and Williams "master form" bench gears, to the Williams system of internal gearing and rolled gearing. The last subject is here first presented in book form.

MECHANICAL ENGINEERING DETAIL TABLES.

By John P. Ross. Lond. & N. Y., Isaac Pitman & Sons, 1923. 197 pp., diagrams, tab., 7 x 5 in., cloth. $2.25.

This compilation, by an experienced draftsman, is intended to supply machine designers with the proportions of a number of machine details that are common to all machines. The tables include dimensions for the usual sizes of studs, rivets, nuts, bolts, handles, ratchets,

wrenches, links, joints, shafting, keys, keyways, bearings, hooks, chains, engine and pump details, condenser details, valves and cocks, pipes, flanges and fittings, ship's fittings and wire ropes. The methods follow English practice.

OIL POWER.

By Sydney H. North. (Pitman's Common Commodities and Industries.) Lond. & N. Y., Isaac Pitman & Sons, [1922]. 122 pp., illus., tab., 7 x 5 in., cloth. $1.00.

This book contains a concise, yet comprehensive, account of the use of oil for power production, which covers the subject in a general manner, without attempting great detail on its many aspects. It is intended for engineers, shipowners, and users of fuel. Gives special attention to the economic advantages of oil.

INTRODUCTION TO THE STUDY OF METALLOGRAPHY AND MACROGRAPHY.

By Léon Guillet and Albert Portevin. N. Y., McGraw-Hill Book Co., 1922. 289 pp., illus., diagrams, 10 x 6 in., cloth. $6.00.

This important book presents in English the conclusions of two distinguished French investigators in the subject, and at the same time, as a product of French thought, presents a view of that subject which is not quite the same as that of any of the standard treatises in English on metallography. The book in an introductory one, the aim having been to outline principles and to illustrate them by means of the most typical and important industrial examples. Its general purpose, however, is practical, and it should be of real assistance to those engaged in manufacturing or using metals. Special features of the book are the detailed description of the constituents and structures of carbon steels, the account of alloy steels, the discussion of the impurities of industrial metals, and the large number of photographs. The final section, on macrographic technique and its industrial applications, will be valuable.

MINERALOGY OF PENNSYLVANIA.

By Samuel G. Gordon. (Special Publication, No. 1.) Phila., Academy of Natural Sciences of Philadelphia, 1922. 255 pp., illus., 10 x 7 in., paper. $2.75.

This monograph is a full account of the minerals of Pennsylvania and their occurrence. Chapter 1 includes a brief historical outline of the development of mineralogy in that State. Chapter 2 discusses the origin and occurrence of minerals and outlines their grouping into characteristic assemblages. Chapter 3 presents a summary of the general geology of Pennsylvania, in tabular form. In Chapter 4, the minerals are described in the order of Dana's classification, the descriptions including crystallographic and chemical data and the Pennsylvania occurrences of each mineral. Chapter 5, on the mineral localities of the State shows the distribution of minerals in greater detail. The final chapter gives a bibliography.

GEOLOGY OF THE TERTIARY AND QUATERNARY PERIODS

In the North-West Part of Peru. By T. O. Bosworth. Lond., Macmillan & Co., 1922. 434 pp., illus., maps, 9 x 6 in., cloth. 45 shillings.

This volume deals with the geology, paleontology, and the oil industry in the petroliferous region of Northwestern Peru. It presents the conclusions resulting from the geological surveys conducted by the author during the past decade, and a study of the tertiary paleontology of the region by others. The geological papers are new, as they present the results of pioneer work in an unsurveyed territory. They have previously appeared in the *Quarterly Journal* of the Geological Society.

FOUR HOUR DAY IN COAL.

By Hugh Archbald. N. Y., H. W. Wilson Co.; Lond., Grafton & Co., 1922. 148 pp., tab., 8 x 5 in., cloth. $1.50. (Gift of Bureau of Industrial Research.)

This book, by a mining engineer, is a readable account of conditions in the coal mines. The author presents the grievances of miners and operators, the origin of these grievances and the factors that impede their adjustment. Mr. Archbald ascribes the troubles of coal mining chiefly to over-development.

DICTIONARY OF APPLIED CHEMISTRY: Vol. 4.

By Sir Edward Thorpe. Lond. & N. Y., Longmans, Green & Co., 1922. 740 pp., 9 x 6 in., cloth. $20.00.

This well-known work of reference has been thoroughly revised to date, the present volume including matter published as recently as 1922. Vol. 4, includes many subjects of technical interest, such as the manufacture of matches, and nitric acid; the utilization of atmospheric nitrogen; the metallurgy of lead, magnesium, nickel, mercury, osmium, and molybdenum; metallography; mercerizing; leather; naphthalene. Extensive articles on these and other topics, by well-known authorities, characterize the book.

INTRODUCTION TO THEORETICAL AND APPLIED COLLOID CHEMISTRY.

By Wolfgang Ostwald. Second American Edition, Translated from the Eighth German Edition by M. H. Fischer. N. Y., John Wiley & Sons; Lond., Chapman & Hall, 1922. 266 pp., illus., diagrams, portrait, 9 x 6 in., cloth. $2.50.

This is a revised and enlarged edition of the principal lectures delivered by the author during his American visit in 1913–14. These lectures were intended for those with little or no knowledge of colloid chemistry and as a general survey of the subject, with particular emphasis on its great possibilities of scientific and technical application.

RECOVERY OF VOLATILE SOLVENTS.

By Clark Shore Robinson. N. Y., Chemical Catalog Co., 1922. 188 pp., illus., diagrams, 9 x 6 in., cloth. $2.50.

The object of the author has been to present, in as simple and complete form as possible, the fundamental principles involved in the recovery of solvents, to illustrate these principles by numerous examples, to discuss the factors that enter into the design of equipment for recovering solvents, and to describe the standard forms of apparatus used in the more common cases. The book is based on seven years of personal experience and on the technical literature of the subject during the past forty years. An annotated bibliography is included.

FILTRATION.

By T. Roland Wollaston. (Pitman's Technical Primers). Lond. & N. Y., Isaac Pitman & Sons, 1922. 102 pp., illus., diagrams, 6 x 4 in., cloth. 85 cents.

The author has written an elementary work on industrial methods and equipment for the filtration of liquids and gases, which is intended as an introduction to the work of specialists on the various phases of the subject.

VECTOR CALCULUS, WITH APPLICATIONS TO PHYSICS.

By James Byrnie Shaw. N. Y., D. Van Nostrand Co., 1922. 314 pp., 8 x 5 in., cloth. $3.50.

The text embodies the author's lectures to graduate students. The attempt has been to give a text to the mathematical student on the one hand, in which every physical term beyond mere elementary terms is carefully defined. On the other hand, for the physical student, there is a large collection of examples and exercises which will show him the utility of the mathematical methods. The system adopted is algebraic.

QUANTUM THEORY.

By Fritz Reiche. N. Y., E. P. Dutton & Co., no date. 183 pp., 8 x 5 in., cloth. $2.50.

In this treatise, the author has attempted to give in broad outline the most important features of the doctrine of quanta, its origin, its development, and its ramifications. An appendix entitled "Mathematical Notes and References", provides a useful list of the important writings on the subject.

RATE-MAKING FOR PUBLIC UTILITIES.

By Lamar Lyndon. N. Y. & Lond., McGraw-Hill Book Co., 1923. 209 pp., 8 x 6 in., cloth. $2.00.

Although several excellent works on parts of the subject of valuation and rate-making have appeared, Mr. Lyndon believes that none of these covers certain essentials, nor are they adapted for the reading of engineers, municipal authorities, bankers, and business men. This book is intended to point out the logical, mathematically exact conclusions for each and every factor that enters into the question. The reasons for these conclusions are set forth in detail.

LABOR TURNOVER IN INDUSTRY.

By Paul Frederick Brissenden and Emil Frankel. N. Y., Macmillan Co., 1922. 215 pp., tab., 9 x 6 in., cloth. $3.50.

The questions discussed in this work include the general extent of labor mobility, labor mobility in individual plants and in special groups within the work force, causes of turnover, seasonal influences, effects of length of service, and responsibility for instability. The investigation is based on statistics collected for the U. S. Bureau of Labor Statistics, from over 260 establishments employing more than 500 000 workers. The problem is treated primarily from the point of view of the individual establishment.

COST ACCOUNTING PROCEDURE.

By William B. Castenholz. Chic., La Salle Extension University, 1922. 333 pp., charts, 9 x 6 in., cloth. $3.50.

In this work a serious effort has been made to contribute something of value on procedure in cost accounting. Not only are the underlying principles and their application discussed, but methods of keeping cost account are presented. The book is devoted chiefly to a single-plan cost accounting by production orders, which the author considers more generally applicable than any other. The use of this method, as applied to an assembling industry, is explained in detail.

STEAMBOAT-INSPECTION SERVICE.

By Lloyd M. Short. (Institute for Government Research. Service Monographs, No. 8.) N. Y. & Lond., D. Appleton & Co., 1922. 130 pp., 9 x 6 in., cloth. $1.00.

This book reviews the Steamboat-Inspection Service in the same way that previous monographs of this series have described other services of the United States Government. It contains the history of the establishment and development of the service, its functions, its organization, its plant, the laws and regulations governing it, a statement of its finances, and a bibliography of the sources of information about it.

STARCH AND STARCH PRODUCTS.

By Harold A. Auden. (Pitman's Common Commodities and Industries.) Lond. & N. Y., Isaac Pitman & Sons, [1922]. 121 pp., illus., 7 x 5 in., cloth. $1.00.

This book contains a popular account of the starch industry, which sets forth the facts of general interest and also draws attention to the importance of this substance.

STRAW HATS.

By Harry Inwards. (Pitman's Common Commodities and Industries.) Lond. & N. Y., Isaac Pitman & Sons, [1922]. 126 pp., illus., 7 x 5 in., cloth. $1.00.

This book contains an account of the history of the industry and of the various processes used in the manufacture of straw hats.

VELVET AND CORDUROY INDUSTRY.

By J. Herbert Cooke. (Pitman's Common Commodities and Industries.) Lond. & N. Y., Isaac Pitman & Sons, [1922]. 116 pp., illus., 7 x 5 in., cloth. $1.00.

The author has presented, in this book, a brief account of the materials and methods used in the industry, with information on economic questions.

COURS COMPLET DE MATHÉMATIQUES SPÉCIALES;

Tome 3, Méchanique. By J. Haag. Paris, Gauthier-Villars et Cie., 1922. 188 pp., 10 x 6 in., paper. 12 francs.

In this volume on mechanics, Professor Haag lays emphasis on the experimental origin of that science, even though he proves that like any other mathematical theory an entirely abstract exposition of it may be given. His study begins with kinematics, from which topic he proceeds to dynamics and finally to statics, which is considered as a particular case of dynamics. Although primarily a work on theoretical mechanics, applied mechanics has not been neglected, but has been included by a large number of problems that occur in physics or in industry.

ANNUAIRE DU BUREAU DES LONGITUDES, 1923.

By France: Bureau des Longitudes. Paris, Gauthier-Villars et Cie., [1922]. 860 pp., portrait, maps, tab., 6 x 4 in., paper. 6 francs 5c.

This convenient reference book has appeared annually for 128 years. The volume for 1923, like its predecessors, covers a wide field of statistical information, astronomical, physical, geographical, and social. Five star maps are included, and an extensive review of the climate of France.

FREDERICK LAW OLMSTED, LANDSCAPE ARCHITECT, 1822-1903:

Vol. 1. By F. L. Olmsted, Jr., and Theodora Kimball. N. Y., G. P. Putnam's Sons, 1922. 131 pp., portrait, 9 x 6 in., cloth. $2.50.

The present volume of Mr. Olmsted's papers is intended as an introduction to a series covering his main activities as a landscape architect, in which the writings are to be arranged by large groups, according to the nature of the works in connection with which they were written. It supplies the background of his professional career, by a series of biographical notes covering his life from 1822 to 1903, an account of his early experiences, including autobiographical passages from his writings, and a brief summary of American landscape gardening in 1857, when Mr. Olmsted became Superintendent of Central Park in New York City.

PLANNING OF THE MODERN CITY.

By Nelson P. Lewis. Second Edition. N. Y., John Wiley & Sons; Lond., Chapman & Hall, 1923. 457 pp., illus., diagrams, plans, 9 x 6 in., cloth. $5.00.

Most books on city planning, Mr. Lewis says, have been written either by architects, who consider it as an architectural problem, or by students of government, who regard it as an administrative problem. This book is written with the idea that the fundamental problems are engineering problems, for the solution of which the responsibility should rest with municipal engineers. In this edition, the record of important accomplishments has been brought to date, the chapters on "Restrictions" and "Progress and Methods" have been rewritten, and the index has been improved.

STRUCTURAL DRAFTING AND THE DESIGN OF DETAILS.

By Carlton Thomas Bishop. Second Edition. N. Y., John Wiley & Sons; Lond., Chapman & Hall, 1922. 352 pp., diagrams, tab., 8 x 11 in., cloth. $5.00.

This book for students and structural draftsmen corresponds in scope to the duties of the structural steel draftsman, and, therefore, covers not only the preparation of the detailed working drawings for steel structures, but also the design of the details of construction. It is a textbook in structural drafting and may be used as a textbook in elementary structural design. The new edition has been prepared to meet the extensive changes in the standards of the Association of American Steel Manufacturers. At the same time, other changes and corrections have been made.

PRACTICAL MECHANICS AND STRENGTH OF MATERIALS.

By Charles W. Leigh. N. Y. & Lond., McGraw-Hill Book Co., 1923. 293 pp., diagrams, tab., 8 x 5 in., cloth. $2.25.

This work is an elementary textbook presenting those principles of mechanics and strength of materials that are needed by the practical man. The text is intended for high schools and vocational schools.

DIE STATIK DES EISENBAUES.

By W. L. Andrée. Second Edition. München u. Berlin, R. Oldenbourg, 1922. 521 pp., diagrams, tab., 10 x 6 in., paper. $3.00.

The author has prepared a practical handbook for the designer of steel structures, intended to give him a collection of the most useful methods for solving the problems of statics that arise in the design of ordinary structures. The book contains more than one hundred examples, taken from practice, of steel buildings, shops, markets, craneways, hangars, shipways, conveyor frames, cooling towers, bridges, cableways, loading bridges, pontoon bridges, etc. In every case, the author has tried to present the most suitable method of calculation. An appendix presents, in concise form, the foundation and development of the most important method for statically indeterminate systems.

TREATISE ON THE PRINCIPLES AND PRACTICE OF DOCK ENGINEERING.

By Brysson Cunningham. Third Edition. Lond., Charles Griffin & Co., 1922. 600 pp., illus., pl., 9 x 6 in., cloth. $10.00. (Gift of J. B. Lippincott Co.)

Mr. Cunningham's treatise covers the subjects of dock design and construction, jetties, wharves and piers, dock-gates and caissons, sheds and warehouses, dock bridges and dock equipment. The book aims to be thorough, rather than extensive, in its treatment, and to investigate in detail rather than in general. This edition has been thoroughly revised and brought up to date by the inclusion of new material and illustrations.

CURRENT CIVIL ENGINEERING LITERATURE

KEY TO ABBREVIATED REFERENCES TO PUBLICATIONS INDEXED*

Abbreviated References.	Publication.	Place.
Am. C. Inst	*American Concrete Institute, Proceedings* (Y.)	Detroit
A. I. E. E.	*American Institute of Electrical Engineers, Journal* (M.)	New York
A. R. E. A.	*American Railway Engineering Association, Proceedings* (Y.)	Chicago
A. S. T. M.	*American Society for Testing Materials, Proceedings* (Y.)	Philadelphia
Am. Soc. C. E.	*American Society of Civil Engineers, Proceedings* (M.)	New York
Am. Soc. Mun. Impvts.	*American Society for Municipal Improvements, Proceedings* (Y.)	New York
Am. W. W. Assoc.	*American Waterworks Association, Journal* (Bi-M.)	Baltimore
Am. Wood Prs. Assoc.	*American Wood Preservers Association, Proceedings* (Y.)	Baltimore
Ann. P. et C.	*Annales des Ponts et Chaussées* (Bi-M.)	Paris
Ann. T. P. Belg.	*Annales des Travaux Publics de Belgique* (Bi-M.)	Brussels
Assoc. Ing. Gand.	*Annales de l'Association des Ingénieurs sortis des Ecoles Spéciales de Gand* (Q.)	Ghent
Bost. Soc. C. E.	*Boston Society of Civil Engineers, Journal* (M.)	Boston
Can. Engr.	*Canadian Engineer* (W.)	Toronto
Cem. Eng.	*Cement and Engineering News* (M.)	Chicago
Cornell C. E.	*Cornell Civil Engineer* (M.)	Ithaca
Dock & Harbour	*Dock and Harbour Authority* (M.)	London
Eisenbau	*Der Eisenbau* (M.)	Leipzig
Eng.	*Engineering* (W.)	London
Eng. & Contr.	*Engineering and Contracting* (W.)	Chicago
Eng. Inst. Can.	*Engineering Institute of Canada, Journal* (M.)	Montreal
Eng. N. R.	*Engineering News-Record* (W.)	New York
Engrs. Soc. Pa.	*Engineers' Society of Pennsylvnia, Journal* (M.)	Harrisburg
Engrs. Soc. W. Pa.	*Engineers' Society of Western Pennsylvania, Journal* (M.)	Pittsburgh
Engr.	*Engineer* (W.)	London
Engrs. & Eng.	*Engineers and Engineering, Engineers' Club of Philadelphia* (M.)	Philadelphia
Gen. Civ.	*Le Génie Civil* (W.)	Paris
Gesund. Ing.	*Gesundheits Ingenieur* (W.)	Munich
Inst. C. E.	*Institution of Civil Engineers Minutes of Proceedings* (Q.)	London
Inst. Mun. & Co. Engrs.	*Institution of Municipal and County Engineers, Journal* (W)	London
Int. Ry. Cong. Assoc.	*International Railway Congress Association, Bulletin* (M.)	Brussels
Land. Arch.	*Landscape Architecture* (M.)	Harrisburg
Mech. Eng.	*Mechanical Engineering* (M.) *Journal of the American Society of Mechanical Engineers*	New York
Mil. Engr.	*Military Engineer* (M.)	Washington
Min. & Metal.	*Mining and Metallurgy* (M.) *American Institute of Mining Engineers*	New York
Mun. & Co. Eng.	*Municipal and County Engineering* (M.)	Indianapolis
N. E. W. W. Assoc.	*New England Water Works Association, Journal* (M.)	Boston
N. Y. R. R Club.	*New York Railroad Club, Proceedings* (M.)	Brooklyn
Oest. Ing. Arch. Ver.	*Oesterreichischer Ingenieur und Architekten Verein, Zeitschrift* (W.)	Vienna
Power	*Power* (W.)	New York
Rev. Gen.	*Revue Générale des Chemins de Fer* (M.)	Paris
Ry. Age	*Railway Age* (W.)	New York
Ry. Eng. & Main.	*Railway Engineering and Maintenance* (M.)	Chicago
Ry. Rev.	*Railway Review* (W.)	Chicago
Schw. Bauz.	*Schweizerische Bauzeitung* (W.)	Zurich
Sci. Am.	*Scientific American* (M.)	New York
Soc. Ing. Civ. Fr.	*Société des Ingénieurs Civils de France, Mémoires et Comptes Rendus* (Q.)	Paris
Ver. deu. Ing.	*Verein deutscher Ingenieure, Zeitschrift* (W.)	Berlin
West. Ry. Club.	*Western Railway Club, Proceedings* (M.)	Chicago
West. Soc. Engrs.	*Western Society of Engineers, Journal* (M.)	Chicago
Zeit. Bau.	*Zeitschrift fur Bauwesen* (Q.)	Berlin
Z. d. Bauver.	*Zentralblatt der Bauverwaltung* (Semi-Weekly)	Berlin

* Y = Yearly; Q = Quarterly; M = Monthly; F = Fortnightly; W = Weekly.

B. Applied Mechanics

a. Mechanics of Solids (Strength of Materials)

2. Elastic Solids

Distribution of Stress in Thin Mild-Steel Plates of Rectangular Shape, Fixed Along Their Edges, and Subject to Uniformly-Distributed Loads.* Bernard Courtney Laws. Inst. C. E. 1921–22, Pt. 1.

Column Strength of Single Angles.* Eng. N. R. Dec. 28, '22.

b. Hydraulics

3. Industrial Hydraulics

Design and Performance of a New Impulse Water-Turbine.* Eric Crewdson. Inst. C. E. 1921–22, Pt. 1.

Hydro-Electric Installations of the Barcelona Traction, Light and Power Company.* Horace Field Parshall. Inst. C. E. 1921–22, Pt. 1.

Guniting Steel Penstocks to Eliminate Trouble Due to Ice Formation.* J. A. McCrory. Can. Engr. Jan. 9, '23.

C. Materials of Construction and General Processes

a. Lime, Cement, Mortar, Concrete, Brick, Bitumen, etc.

Aggregate Strength No Measure of Concrete Strength.* F. E. Giesecke. Cem. Eng. Nov., '22.

To Avoid Variable Concrete Due to Variable Sand Wetness. R. L. Bertin. Cem. Eng. Nov., '22.

Heat Transmission Through Wall Materials. (From *The Surveyor.*) Can. Engr. Jan. 2, '23.

Storage and Transportation of Cement. W. M. Myers. (From Reports issued by U. S. Bureau of Mines.) Can. Engr. Jan. 2, '23.

f. Rock Excavation, Mining, Rock Removal

Explosives and Blasting. S. R. Russell. (Paper read before Nat'l Crushed Stone Assoc.) Cem. Eng. Nov., '22.

Abstracts of Institute Papers.* Min. & Metal. Jan., '23.

g. Execution of Works. Specifications

5. Of Reinforced Concrete

A Spiral Staircase Constructed in Reinforced-Concrete.* Henry Walter Cowling. Inst. C. E. 1921–22, Pt. 1.

The Use of Reinforced Concrete for Pit-Head Gears.* W. L. Scott. Eng. Jan. 5, '23.

h. Foundations

Foundation and Framing Design of Colfax Power Station.* M. E. Thomas. Eng. N. R. Dec. 28, '22.

k. Tunnels and Tunneling-Shields

Small Tunnels Lined with Precast Concrete Ribs.* Eng. N. R. Dec. 28, '22.

Methods of Tunneling in Wet Ground.* W. G. Cameron. (From *The Contract Record.*) Eng. & Contr. Jan. 17, '23.

Vehicular Tunnel Shaft's Deep Foundation.* Frank W. Skinner. Eng. & Contr. Jan. 17, '23.

D. Highways

c. Construction

Methods Employed on Difficult Road Construction on Ozark Trail Highway in Eastern Arkansas.* Albert S. Fry. Mun. & Co. Eng. Dec., '22.

Solving the Highway Problem in Quebec Municipalities.* John Stanley Crandell. (Paper read before Union of Quebec Municipalities.) Can. Engr. Dec. 19, '22.

How to Inspect Asphalt Paving Mixtures at the Plant.* W. J. Emmons. Eng. N. R. Dec. 28, '22.

Relation Between Bitumen and Fine Mineral Asphaltic Mixtures. Hugh W. Skidmore. (Paper read before Iowa Eng. Soc.) Mun. & Co. Eng. Jan., '23.

Data on Brick Pavement Construction at Detroit, Minn. John F. Druar. Mun. & Co. Eng. Jan., '23.

Efficiency in the Application of Asphalt Filler.* J. F. Gallagher. Mun. & Co. Eng. Jan., '23.

Relaying 23-Year Old Brick in New Pavement at Lynchburg, Va.* Boyd A. Bennett. Mun. & Co. Eng. Jan., '23.

Highway Activity in Province of Saskatchewan.* H. S. Carpenter. Can. Engr. Jan. 2, '23.

Steel Fabric Reinforcements for Concrete Pavements. W. C. Kuhn. (From paper read before New Jersey Highway Assoc.) Can. Engr. Jan. 2, '23.

Methods of Constructing Perryville-Port Deposit Road.* A. F. Shure. Eng. & Contr. Jan. 3, '23.

Difficult Highway Grading on Iron Range.* Eng. & Contr. Jan. 3, '23.

Storm King—A Modern Road Built Under Pioneer Conditions.* Eng. N. R. Jan. 11, '23.

Developments in Methods of Constructing Brick Pavements. Arthur H. Blanchard. (Paper read before Conference on Highway Eng.) Can. Engr. Jan. 16, '23.

h. Computations, Tests, etc.

A Damage Basis for Highway Calculations. H. Hankinson. Inst. Mun. & Co. Engrs. Dec. 19, '22.

Practical Lessons from the Bates Road Tests.* Eng. N. R. Jan. 11, '23.

Economic Theory of Highway Grades.* T. R. Agg. Eng. N. R. Jan. 11, '23.

E. Bridges, Viaducts, and Arches

a. Timber Bridges and Viaducts

Heavy Trestlework Required on New Logging Railroad.* Eng. N. R. Dec. 28, '22.

b. Iron or Steel Bridges and Viaducts

Rebuilding Niagara Bridge of the Michigan Central R. R.* Ry. Rev. Dec. 23, '23.
Michigan Central to Build New Bridge at Niagara.* Ry. Age Jan. 13, '23.
New 640-ft. Arch Span Bridge at Niagara Falls.* H. Ibsen. Can. Engr. Jan. 16, '23.

d. Maintenance

Continuous Frame Design Used for Concrete Highway Bridges.* Arthur G. Hayden. Eng. N. R. Jan. 11, '23.
Tests of Knees for Continuous Frame Concrete Bridges.* Arthur G. Hayden. Eng. N. R. Jan. 18, '23.

F. Inland Waters

c. Regulation of Waterways—Volume of Discharge, Freshets, Floods, Soundings

Hydrology of the 1922 Flood in the Illinois River.* H. E. Grosbach. Eng. N. R. Dec. 28, '22.
The Delta of the Mississippi River.* Elliott J. Dent. Mil. Engr. Jan.–Feb., '23.
The Mississippi Problem in Light of the 1922 Flood.* Eng. N. R. Jan. 4, '23.
Hydrologic Record of the Mississippi Floods from 1882 to 1922.* Edward N. Chisholm. Eng. N. R. Jan. 18, '23.

d. Diverting Dams. Locks. Lifts. Elevators. Inclined Planes

An Unusual Accident to a Beartrap.* Malcolm Elliott. Mil. Engr. Jan.–Feb., '23.

f. Supply, Sources of Water, Drains, Reservoirs

Transmountain Diversion of Water in Colorado.* Eng. N. R. Jan. 18, '23.

g. Consolidation of Banks, Leakage, etc.

Reclamation Plant and Its Operation.* Gascoigne Lumley. (Paper read before Inst. Mech. Engrs.) Eng. Dec., '22.

j. Dockyard Machinery and Shipyards. Dry Docks

Waterfront Improvements in the Central Business District of Pittsburgh. E. K. Morse. Engrs. Soc. W. Pa. Oct., '22.

G. Maritime Works

g. Dredges and Dredging. Force Pumps. Refloating and Removing Wrecks. Ice-Breakers

Reclamation Plant and Its Operation.* Gascoigne Lumley. (Paper read before Inst. Mech. Engrs.) Eng. Dec. 22, '23.
Economic Loading for a Hopper Dredge.* Mil. Engr. Jan.–Feb., '23.

h. Wharves. Mooring Buoys. Harbor Equipment

On the Stability of Deep-Water Quay-Walls.* Francis Ernest Wentworth-Shields. Inst. C. E. 1921–22, Pt. 1.
Deep-Water Quays: General Considerations of Design.* Ernest Latham. Inst. C. E. 1921–22, Pt. 1.

i. Harbors (General Articles)

The Ports of the Dutch East Indies. Wouter Cool. (Paper read before Inst. Assoc. of Navigation Cong.) Dock & Harbour Jan., '23.
The Development of the Port of Kobe.* O. Matsumato. Dock & Harbour Jan., '23.

H. Railroads. Street and Interurban Railways. Automobiles. Aeronautics

a. Railroads

1. General articles

The Indian Railway Gauge Problem.* Frederick George Royal-Dawson. Inst. C. E. 1921–22, Pt. 1.
New Transcontinental Line in Northern Argentina.* Richard F. Maury. Ry. Age Dec. 30, '22.

2. Location

A Method of Introducing Transition Curves.* Reginald Braham Robinson. Inst. C. E. 1921–22, Pt. 1.

3. Roadbed. Construction Work. Tunnels

Blasting Rip Rap Economically.* R. E. Murphy. Ry. Eng. & Main. Jan., '23.

4. Track

Treating Plant Solves New Haven's Tie Problem.* Ry. Age Dec. 23, '22.
Preservative Treatment of Ties and Timber. F. C. Shepherd. (Paper read before New England R. R. Club.) Eng. & Contr. Jan. 17, '23.

5. Signals and Safety Apparatus

Trials in Connection with the Application of the Vacuum for Long Freight-Trains.* Henry Fowler and Herbert Nigel Gresley. Inst. C. E. 1921–22, Pt. 1.

Control of Trains, in Relation to Increased Weight and Speed Combined with Reduced Headway.* Alan Wood Rendell. Inst. C. E. 1921–22, Pt. 1.

Controlled Manual Block in Hauenstein Tunnel.* T. S. Lascelles. (From *Railway Signal Engineer.*) Int. Ry. Cong. Assoc. Dec., '22.

Traffic Direction by Signal Indication on D. L. & W.* Ry. Age Dec. 23, '22.

6. Rolling Stock (Locomotives, Cars)

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